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COLLECTIVE EFFICACY AND GROUP FUNCTIONING: THE EFFECT OF
PERFORMANCE FEEDBACK ON EFFICACY ASSESSMENTS, GOAL SETTING,
TASK PERSISTENCE AND OVERALL PERFORMANCE

A DISSERTATION SUBMITTED TO
THE FACULTY OF THE GRADUATE SCHOOL
IN CANDIDACY FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

PROGRAM IN APPLIED SOCIAL PSYCHOLOGY

BY

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ABSTRACT

This study examined the effect of collective efficacy on group functioning across a series of cognitive tasks. Specifically, this experiment used performance feedback to manipulate efficacy levels in order to investigate the effect of efficacy on group goal setting, task persistence, and overall performance. The effect of experimental manipulations and sequence were investigated at both the task specific (prediction for current task) and general efficacy (estimates of general competence on such tasks) levels. Finally, group behavior was examined across a series of tasks in order to investigate the dynamic properties of collective efficacy.

Seventy-five 3-person groups worked on four different cognitive tasks. Groups were assigned to one of three conditions—high efficacy, low efficacy or a no-efficacy control. Collective efficacy was manipulated using bogus performance feedback: positive (high), negative (low) and no feedback (control). An extremely difficult analytical reasoning problem (all groups failed the problem) was used to create failure on the third task. General collective efficacy was assessed immediately following task performance, prior to performance feedback. Task specific efficacy was measured prior to task performance, immediately following feedback from the previous task. Goal setting and persistence were examined on the final task. Scores on Task 2 and Task 4 were used to measure performance as a function of collective efficacy.

Performance feedback had the expected effects on both specific and general efficacy. In general, groups receiving positive feedback (i.e., high efficacy condition) recorded higher general efficacy ratings and had stronger performance expectations for

upcoming tasks than groups receiving negative feedback (low efficacy condition). As predicted, both assessments varied across time of measurement depending upon condition.

In terms of outcomes, collective efficacy did have a significant effect on task persistence, with high efficacy groups spending more time on Task 4 than low efficacy groups. Low efficacy groups also set significantly lower goals for performance than control groups. Contrary to predictions, however, efficacy levels did not influence performance on either Task 2 or Task 4. Performance effects were in the expected direction but not significant. In general, controls and high efficacy groups behaved in a similar manner (i.e., recorded similar efficacy levels, performed at the same level) throughout the experiment.

The views expressed in this article are those of the author and do not reflect the official policy or position of the United States Air Force, Department of Defense, or the U. S. Government.

CHAPTER 1

INTRODUCTION

Groups play a prominent role in our world. They fulfill personal and social needs, promote survival and allow us to accomplish feats that are beyond any one individual's capability. The presence of groups is felt in our personal identity, our social relationships, and even our work. Indeed, this presence is particularly strong in work settings, as teams have taken center stage in many organizations (Campion, Medsker, & Higgs, 1993; Gordon, 1992; Hackman, 1998; Mischel & Northcraft, 1997). Companies entrust their most difficult decisions and complex tasks to some type of small work group whether it is a project team, task force, or ad hoc committee. The military, for example, relies on aircrews, army platoons, and SEAL teams to perform their most important and dangerous missions. Many organizational scholars contend that, "small groups are, quite simply, the basic organizational building blocks of excellent companies" (Shea & Guzzo, 1987, p. 325). With groups thrust in the spotlight, attention has switched from creating the highly functioning worker to developing the highly effective work team. Motivating groups to perform well has become a primary goal of corporate executives, government officials, business managers and other team leaders.

In light of the increasing popularity of group work, social scientists have attempted to gain an understanding of the dynamic and complex nature of group performance. Research has focused on the factors affecting group performance,

highlighting the role of task characteristics and members' resources on group functioning (Forsyth, 1999). Contrary to the common assumption that groups yield superior outcomes, studies have shown groups only outperform individuals on certain tasks (Steiner, 1972). On additive and compensatory tasks (where member inputs are summed or averaged, respectively), a group normally exceeds the performance of individuals. However, on other tasks in which members must agree on a single solution (disjunctive tasks), groups rarely outperform their best member, and on conjunctive tasks (where all members must contribute to the product), group performance is often worse than the group's average member (Tindale, 1993). Although this research has been critical to identifying which tasks are suitable for group work, these findings only suggest a group's potential level of performance in certain situations. They do not identify what motivates groups to perform well in these situations. Task and member characteristics alone cannot guarantee a positive group outcome. Even with the 'right' ingredients, a group may not be motivated to achieve high levels of performance.

Yet, researchers have only recently investigated the effects of underlying mechanisms such as a group's motivation, on group performance. Although some work has been done on the motivational effects of group goal setting (see Weldon & Weingart, 1993), most of the available research has focused on the effect of the group on individual motivation. Studies on social loafing have consistently demonstrated that in many cases individuals do not exert as much effort when they are in groups (see Lichaz & Partington, 1996, for a review). Individual group members often "free ride" when they perceive they can gain the group's rewards regardless of their individual effort (Forsyth, 1999). As such, research efforts have been focused on reducing the process losses of group work,

establishing interventions to maximize the motivation of individual group members. But increasing an individual member's motivation does not necessarily increase the group's motivation to perform well. More research is needed on the factors affecting group motivation.

A potentially important factor comes from Albert Bandura's notion of efficacy (Bandura, 2000). In general, efficacy beliefs refer to an actor's perceptions about his or her power to produce desired effects. They are theorized to be a primary determinant of behavior. Put simply, "unless people believe that they can produce desired results and forestall undesired ones by their actions, they have little incentive to act" (Bandura, 2000, p. 75). Indeed, groups may only exert effort if they perceive they have the ability and skills to accomplish the task. This suggests that a cognitive mechanism, specifically group members' beliefs about their group's ability to attain certain levels of performance, could be a critical ingredient of a group's motivation to perform. In support of this idea, several researchers have included efficacy-like constructs in their models of group effectiveness (Shea & Guzzo, 1987; Campion, Medsker, & Higgs, 1993). Furthermore, Shamir (1990) argues that a group's perceived efficacy should be a primary consideration in calculative models of collectivistic work motivation.

If efficacy beliefs are indeed a mediating influence on a workgroup's motivation, then managing perceptions of capability may be one way to motivate groups to high levels of performance. At the very least, investigating the role of efficacy in a group's functioning seems critical to understanding the nature of group performance. As such, the goal of this research project is to explore the relationship between a group's efficacy beliefs and their overall functioning. Specifically, the current study manipulates

collective efficacy in order to examine how efficacy affects motivational behavior (i.e., task persistence) and overall performance. The study also examines the relationship between collective efficacy and a group's goal choice. Efficacy beliefs are also theorized to affect behavior indirectly through other determinants of human action such as goals and aspirations (Bandura, 2000).

CHAPTER 2

THEORETICAL BACKGROUND

The forthcoming review presents a theoretical overview of both self-efficacy and collective efficacy. Self-efficacy is included because collective efficacy is an extension of self-efficacy theory and as such, provides a foundation for understanding efficacy beliefs at the group level. Although distinct, the two constructs operate in much the same manner (e.g., share the same determinants, affect similar consequences).

Self-Efficacy

Both in and out of the laboratory, there is considerable evidence to suggest that beliefs about success (e.g., efficacy) are highly related to achieving that success. Self-efficacy “refers to beliefs in one’s capabilities to organize and execute the courses of action required to produce given attainments” (Bandura, 1997, p.3). Theorists contend that efficacy beliefs are a primary determinant of human behavior. Efficacy expectations are hypothesized to influence behavior through three primary mechanisms--cognitive, motivational, and affective (Little & Madigan, 1997). Personal efficacy influences people’s “success/failure imagery, worry, goal setting, and attributions” (George & Feltz, 1995). For example, efficacious individuals are more likely to visualize future success which often leads to increased concentration and effort during actual performance (Little & Madigan, 1997). Efficacious individuals are also more likely to attribute success to a dispositional cause rather than a situational factor. Self-serving attributions have been

found to increase the amount of effort and persistence exerted in accomplishing tasks (George & Feltz, 1995). Efficacy beliefs also influence how individuals interpret new information. Inefficacy, for example, may prompt individuals to view new information, even if positive, in a negative light (e.g., more resources will not help), resulting in more detrimental behavior (e.g., lack of effort, lowering standards).

It is important to note, however, that self-efficacy is a major determinant of behavior only when the “proper incentives and necessary skills are present” (George & Feltz, 1995, p.102). Although efficacy beliefs can influence a person’s motivation to learn a new skill, these beliefs cannot substitute for skill level. An amateur basketball player cannot beat Michael Jordan in a game of one-on-one by simply believing he or she can. According to the theory, such lofty aspirations are unlikely considering perceptions of skill and ability are a major determinant of efficacy beliefs. Even the most confident amateur basketball players are unlikely to believe they can outperform Michael Jordan.

Determinants of Self-Efficacy

Self-efficacy is developed through a variety of sources. One of the major determinants is prior performance or what Bandura (1997) refers to as enactive mastery experiences. Success builds self-efficacy while failure degrades it. Sustained success can even make individuals more resilient after adversity. Self-efficacy is also determined through vicarious experience or social comparisons. Particularly in ambiguous situations, people rely on comparisons with others as a source for developing expectations about their own performance. Individuals often evaluate their performance in terms of normative standards, using similar models to determine whether their performance was good or bad. Similar others can also heighten an individual’s perceived efficacy by

modeling or demonstrating appropriate task behavior (i.e., vicarious experience).

Proficient models increase beliefs about capability not only by showing that it is possible but also by demonstrating how to effectively perform task activities. The social context also shapes personal efficacy through social influence. Indeed, the persuasive messages of significant others can alter performance expectations. A highly regarded coach's precompetition 'pep' talk, for example, may build a player's efficacy beliefs about his or her performance. Words of encouragement may even preserve efficacy in the face of failure. The framing of performance feedback can have a profound effect on efficacy beliefs for a particular task. In organizational settings, a positive appraisal can increase an employee's expectations of success for future feedback-related projects. Indeed, leader behaviors (e.g., transformational, transactional, participation in decision making) are expected to have significant effects on efficacy levels (Durham, Knight, & Locke, 1997; Sosik, Avolio, & Kahai, 1997). However, verbal persuasion is not limited to outside influences but also includes factors such as self-talk and visual imagery (George & Feltz, 1995). Finally, physiological and affective states also impact personal efficacy. Level of stress and mood can affect a person's judgments of his or her capability to perform in a given situation. In general, efficacious individuals are less affected by stress (Little & Madigan, 1997) and more likely to use effective coping strategies to deal with occupational stressors (Jex & Bliese, 1999).

According to efficacy theorists, individuals' integrate and appraise these four sources of efficacy to arrive at an overall efficacy judgment for a particular situation. The weight of any one determinant is likely to vary depending on several factors (e.g., task experience, task complexity, and task environment). Verbal persuasion and

vicarious experience, for example, may lose their effect in the wake of repeated failures.

In general, previous performance is theorized to be the most potent determinant of efficacy beliefs, particularly as outcomes accumulate (Lindsley, Brass, & Thomas, 1995). Indeed, it is important to remember that efficacy beliefs are dynamic and as such, are expected to change over time.

Impact of Self-Efficacy

Self-efficacy beliefs influence several individual outcomes including the “course of action people choose to pursue, how much effort they put forth, and their resilience after failure” (Bandura, 1997, p.3). In support of this claim is an extensive body of research demonstrating a strong positive relationship between personal efficacy and individual behavior across a variety of contexts (see Bandura, 1997, for a review). Self-efficacy has been shown to affect educational achievements (Lent, Brown, & Hackett, 1994; Schunk, 1995), athletic performance (see George & Feltz, 1995, for a review) organizational accomplishments (see Stajkovi & Luthans, 1998, for a review), and health outcomes (Bandura, Adams, Hardy, Howells, 1980). For example, highly efficacious individuals engage in more prescribed coping behaviors in therapeutic settings (Bandura & Schunk, 1981), generate more research in university settings (Taylor, Locke, Lee & Gist, 1984), and have higher managerial ratings in organizational settings (Wood, Bandura & Bailey, 1990). Experimental studies have shown that changes in performance can result from simply manipulating performance expectations. For example, Bouffard-Bouchard (1990) created efficacy expectations by providing participants’ false normative performance feedback (i.e., participants were told their actual performance was higher or lower than peer norms) on a cognitive task. This feedback affected subsequent

performance on cognitive tasks (i.e., participants receiving positive feedback were more successful in solving problems and less likely to reject correct solutions).

Most of the aforementioned performance effects have been demonstrated at the individual level. Less attention has been paid to the effect of these perceptions at the group level. This is unfortunate since a substantial amount of individual behavior is performed in a group context and many problems require collective action to produce desired outcomes. Indeed, more importantly for coaches, managers, and other team leaders is the relationship between a group's beliefs about their effectiveness and their actual performance. Yet, it would be unwise to assume that effects demonstrated at the individual level will automatically transfer to the group context. Research has shown that groups often behave differently than individuals in a variety of contexts (e.g., research on decision making, work on goal setting). With that in mind, researchers have begun considering the effect of a group's efficacy beliefs on group-level outcomes such as goal setting, task behavior, and overall performance.

Defining Collective Efficacy

Collective efficacy is basically self-efficacy theory applied to groups. In collective efficacy, however, it is the group's beliefs about their mutual capability that influence behavior. Bandura (1997) defines collective efficacy as "a group's shared belief in its conjoint capabilities to organize and execute the courses of action required to produce given levels of attainment" (p.477). The theory proposes that group members' weigh, integrate, and evaluate information about their group's capability and then regulate their choices and effort accordingly (Gist, 1987).

At the group level, efficacy judgments influence behavior primarily through a

motivational mechanism (Cannon-Bowers, Tannenbaum, Salas & Volpe, 1995). In line with other motivational theories such as expectancy theory and goal setting theory, collective efficacy emphasizes the link between effort and performance expectancy. Expectancy theory, for example, maintains that a course of action is in part determined by the belief that a certain amount of effort will lead to a certain level of performance (Locke, Motowidlo, & Bobko, 1986). From this perspective, a group will only exert effort if they believe their effort will result in the desired performance outcome. Thoughts about how effort will relate to levels of performance are also a part of a group's efficacy beliefs. However, efficacy beliefs encompass more than just beliefs about how effort results in performance outcomes. According to Bandura (1986), a group will judge their capacity "more in terms of their perceptions of the knowledge, skills, and strategies they have at their command than solely in terms of how much they will exert themselves" (p. 371). Indeed, there are several situations where effort alone does not guarantee performance. This is particularly evident in the group context where factors such as effort and ability must be appropriately integrated to produce an overall outcome. In these situations, success is often determined by a group's ability to coordinate each individual member's input. In other cases, the context makes effort less of a determinant of a group's performance. Consider the group who has consistently performed poorly in stressful situations. According to collective efficacy theory, their future performance in such situations will be adversely affected by self-debilitating thought patterns (Bandura, 1986). No matter how much effort they exert, they will not be able accomplish the task.

Efficacy beliefs are related to thought patterns that influence motivation such as attributions, goal setting, performance visualization and reactions to performance

feedback (George & Feltz, 1995). For example, efficacious groups are more likely to attribute success to the group rather than situational factors. Attributing success to the person as opposed to the situation results in increased motivation to pursue goals and greater resilience after failure (Little & Madigan, 1997). Efficacious groups are also more likely to associate failure or negative feedback with negative self-evaluations which often leads to increases in motivational behavior such as effort and persistence on subsequent task performance (Gist, 1987). As compared to low efficacy groups, high efficacy groups are usually more persistent and more successful in their outcomes. In collective efficacy, it is the group's cognitive appraisal of capability that drives motivational behavior such as effort, persistence, and choice of activities.

Sources of Collective Efficacy

A collective sense of efficacy “emerges from common exposure of members to objective stimuli (such as outcomes of group performance) and the processes of social influence and social comparison” (Lindsley, Brass, & Thomas, 1995, p.648). As such, the sources of collective efficacy include enactive mastery experiences, vicarious experiences, verbal persuasion as well as physiological and emotional states (Bandura, 1997). Consistent with self-efficacy, past performance is the primary determinant of collective efficacy. A group's prior success will undoubtedly increase their efficacy level but other factors also contribute. For example, comparison processes may be weighed more heavily in a team's efficacy perceptions when faced with an opponent with a better win-loss record. At the same time, a coach's persuasive pre-game speech might elevate a team's perceptions about success even in the face of a more successful opponent. In organizations, leadership styles (i.e., transformational vs. transactional) play a role in

team efficacy levels (see Sosik, Avolio, & Kahai, 1997).

In contrast to self-efficacy, however, other group member's prior performance, how they perform in relation to others, and their physiological and emotional state become an integral part of the group's efficacy beliefs. A team whose best player is out with an injury is probably less efficacious than when playing at full strength. In a group context, efficacy judgments are also based on assessments of the interactive abilities of group members. Expectations of group performance are constrained by the fact that groups have to work together to achieve outcomes. Although individually skilled, group members may doubt their group's ability to successfully coordinate the skills and capabilities of each member.

Although collective efficacy "operates through similar processes" (Bandura, 2000, p.76) as self-efficacy, it is considered a distinct construct. Indeed, a highly efficacious group can lead to increases in a member's personal efficacy, but a member with high self-efficacy may or may not consider his or her group high in collective efficacy. Collective efficacy is "not simply the sum of the efficacy beliefs of individual members" (Bandura, 2000, p.76). As previously mentioned, group outcomes are affected by more than just the skills and abilities of individual members. These outcomes are also a product of the interactive and coordinative abilities of the group and their social environment. Indeed, a team with several talented members may fail because they are unable to perform as a team. Mischel & Northcraft (1997) contend that in order to be successful, groups must have "the ability to resolve conflicts, solve problems in a collaborative manner, communicate effectively, set goals, and coordinate tasks" (p.187). If group members do not believe they can coordinate effectively, they will have little

confidence in their group's ability to accomplish the task (Mischel & Northcraft, 1997).

Recent studies have provided empirical support for Bandura's theoretical distinction between the two constructs (Feltz & Lirgg, 1998; Jex & Bliese, 1999; Parker, 1994), especially later in the group's life span. Although ratings of self-efficacy and collective efficacy may be similar early in a group's tenure, a clear difference is expected to emerge as group members learn the strengths and weaknesses of other members and gain more experience interacting in the group.

Although collective efficacy is considered a group-level property, it does not operate independently of the group members. There is no "disembodied group mind that is doing the cognizing, aspiring, motivating, and regulating" (Bandura, 2000, p.76). Collective efficacy represents a combination of individual group members' cognitions regarding the group's capability. As such, it is typically measured by aggregating (normally by averaging member responses) each member's belief in his or her group's ability to perform successfully. Although there has been some dispute among researchers (see Paskevich, Dorsch, Brawley, & Widmeyer, 1999), aggregating responses is considered a more accurate representation than assessments designed to reach a group consensus of efficacy (i.e., utilizing a group response to a single questionnaire). Group responses are particularly susceptible to normative influence and conformity pressures. Bandura (2000) also maintains that "forced consensus masks the variability in efficacy beliefs among factions within a system" (p.76).

Measuring Collective Efficacy

Research on collective efficacy has spawned two major approaches to measuring efficacy levels. Taken from experimental research on self-efficacy, one method assesses

a group's belief about its ability to produce desired outcomes by measuring members' confidence in their group attaining certain performance levels. Individual responses are aggregated to arrive at a group score. Prussia and Kinicki (1996), for example, asked groups members to indicate their confidence in attaining several levels of performance on a brainstorming task (e.g., confidence in generating 20 ideas, generating 48 ideas). Although an accurate gauge of performance expectations, this approach has led to the misconception that collective efficacy is a task specific construct. Measures should be specific in the sense that they must be tailored to the particular group being assessed, but that does not mean they cannot be applied to teams working on a variety of tasks. Indeed, applied researchers, albeit out of necessity, have measured collective efficacy in less task specific terms. Riggs and Knight's (1994) Collective Efficacy Beliefs scale, for example, asks workers to rate their group on an individual level (e.g., "The members of this department have excellent job skills") and a group level ("The unit I work with has above average ability"). Little and Madigan's (1997) questionnaire assessed each member's confidence that his or her work team could accomplish certain behaviors (e.g., "can solve performance problems", "can work together without forming factions"). Finally, Jex and Bliese (1999) assessed a group's efficacy using a four-item scale (e.g., "I have real confidence in my unit's ability to perform its mission"). Interestingly, these more general approaches may better represent the specific beliefs that encompass collective efficacy. Questions target a member's thoughts about important factors such as teammate's skills, the ability of the team to work together, the ability of the team to coordinate resources effectively, etc.

Collective Efficacy and Related Constructs

The use of different methods of measurement has also led to some definitional ambiguity, arguably leading some researchers to command different terms for essentially the same construct. Group potency is defined as a “group’s generalized belief in their effectiveness” (Guzzo, Yost, Campbell, & Shea, 1993). Although often aggregated from individual data, Guzzo et al. (1993) argue that unlike collective efficacy, potency represents a shared belief with high agreement among members. Yet, several definitions of collective efficacy include the notion of “shared beliefs” (Paskevich, Brawley, Dorcsh & Widmeyer, 1999, for review) and studies have shown high inter-rater agreement among members. In the end, the items used on assessments may be the only distinguishing feature between the two constructs. Guzzo et al. (1993) contend that all questions must be about the group (e.g., “The team has confidence in itself”) whereas efficacy researchers allow items about individual group members (e.g., “Some members of my group have the ability to accomplish tasks”). In practice, it is often difficult to distinguish between a group potency measure and a collective efficacy measure. Yet, regardless of which term is used, more importantly for practitioners, is the researchers’ shared focus on establishing a connection between beliefs about effectiveness and group functioning.

Collective efficacy is also related to an older construct referred to as group aspiration level. Group aspiration “is an expectation agreed upon by a number of persons concerning the level of performance their group can realistically achieve in the future” (Zander, Meadow & Efron, 1963). This definition is almost identical to the common method of measuring collective efficacy in experimental settings (e.g., “I am 60% confident my group can solve three out of five problems”). Finally, collective efficacy is

often confused with collective esteem. Although a reciprocal relationship is entirely possible, collective esteem refers to the degree to which individuals value their group whereas collective efficacy concerns members' cognitions about performance capability (Mischel & Nothcraft, 1997).

Process and Outcome Measures of Collective Efficacy

To reduce some ambiguity, researchers are beginning to distinguish between outcome (i.e., targeted toward specific performance levels) and process measures (e.g., ability of groups to coordinate effectively) of collective efficacy. A few studies have assessed collective efficacy using two indicators – confidence in output quantity and confidence in process behaviors (Prussia & Kinicki, 1996; Moss, 1998). As previously noted, use of a particular measure may depend on the research context. Clearly, in non-laboratory settings, task specific outcome approaches (assessing confidence in attaining performance levels for each task performed) may be unrealistic. In these cases, general assessments measuring perceptions of both outcome expectations (e.g., “how confident are you that Team X can solve performance problems”) and process capability (e.g., “how confident are you that Team X can organize itself to maximize resources”) are likely to be more informative (see Little & Madigan, 1996, for an example).

Since both general and specific methods may provide insight into group functioning, the current project assesses both a group's general belief about their overall effectiveness (referred to as general efficacy) and their more specific thoughts regarding performance expectations for particular tasks (referred to as task specific efficacy). Although the general assessment includes an item on the group's ability to interact effectively, both measures are designed to tap outcome expectations of group

functioning. Finally, the current study advocates the perspective that collective efficacy is a group-level construct that is most effectively measured by averaging individual member responses.

Collective Efficacy and Group Functioning

More importantly for coaches, managers, and other group leaders is the effect of collective efficacy on group performance. Collective efficacy is theorized to affect group performance through a variety of mechanisms. Compared to less efficacious, efficacious groups are predicted to expend more effort and be more persistent in accomplishing tasks. It is also hypothesized that high efficacy groups will set higher standards for task performance and be more resilient after failure. Indeed, Bandura (1997) contends that collective efficacy “affects the sense of mission and purpose of a system, the strength of common commitment to what it seeks to achieve, how well its members work together to produce results, and the group’s resiliency in the face of difficulties” (p.469). Although only a few studies have examined these effects, early research indicates that collective efficacy affects a group’s goals (Mulvey & Klein, 1988), their overall performance (Prussia & Knight, 1996; Spink, 1990) and their persistence after failure (Hodges & Carron, 1992).

CHAPTER 3

PREVIOUS RESEARCH ON COLLECTIVE EFFICACY

In contrast to self-efficacy, only a limited amount of research has been done on the effect of collective efficacy on group behavior. Most of the studies have examined the relationship between collective efficacy and overall performance. Only a few have considered its effect on performance related constructs such as task persistence and goal setting.

Collective Efficacy and Overall Performance

Athletic teams. Several studies have found a positive relationship between collective efficacy and athletic performance. In a series of studies, Feltz and Lirgg (1998) investigated the effects of efficacy beliefs on the performance of collegiate ice hockey teams. They found that collective efficacy was positively related to indices of performance (i.e., power play percentage, scoring percentage), particularly at the end of the season. Spink (1990) found similar results while investigating the relationship between perceived collective efficacy and performance among elite volleyball teams. Teams who recorded stronger efficacy ratings placed significantly higher in a competitive tournament than teams with lower ratings.

Work/project teams. Research has also been conducted in organizational and academic settings. Little and Madigan (1997) demonstrated a positive relationship between collective efficacy assessments and the performance of self-managed work

teams at a manufacturing plant. Interestingly, they found little difference in team members' perceptions of their group's technical ability but clear differences in members' perceptions of their efficacy to do their job, supporting the notion that collective efficacy is based on more than just perceptions of skill or ability. More importantly, efficacy differences were related to differences in performance behaviors (e.g., effectively organized resources, successfully solved problems), suggesting that managing beliefs may be just as critical as managing skills when motivating performance. Bandura (1993) found similar results in a study of 79 elementary schools within the same large school district. The stronger the school member's shared beliefs of instructional effectiveness, the better their school's performed academically. Studies (e.g., Mulvey & Klein, 1998; Baker, 2001) have also demonstrated a positive relationship between collective efficacy assessments and performance on academic tasks (i.e., group project, group test scores). Finally, experimental research (Durham, Knight, & Locke, 1997; Silver & Bufanio, 1996) has found that ratings of team efficacy are related to performance on laboratory tasks (e.g., computerized tank battle simulation game, Lego building task).

Efficacy manipulations. Although these field studies demonstrate a positive relationship between collective efficacy and group performance, few studies have manipulated collective efficacy in an experimental setting. In one related study, Zander (1971) found that a group's desire for success affected group performance on a strength task. Using bogus feedback to manipulate desire, groups were randomly assigned to either a low or high desire for success condition. Groups in the high desire for success condition consistently outperformed the groups in the low desire for success condition.

In a more recent study specifically investigating collective efficacy, Hodges and Carron (1992) found that efficacy affected group performance in a muscular endurance task (e.g., holding a medicine ball aloft). They found that high efficacy triads improved their performance after failure whereas low efficacy triads demonstrated a decrement in performance. Interestingly, they failed to find that the collective efficacy manipulation (bogus feedback from a strength dynamometer) impacted initial performance. Groups in both conditions exhibited similar performance on Trial 1 of the experiment. Differences between groups only emerged on Trial 2 using the preferred arm. However, Prussia and Kinicki (1996) did find a positive relationship between collective efficacy and immediate performance. High efficacy groups generated more ideas on a brainstorming task than low efficacy or control groups. In a replication of the Ringleman paradigm, Lichacz and Partington (1996) found that efficacious groups were less susceptible to social loafing. High efficacy groups generated rope pulls that significantly exceeded the sum of their individual efforts.

Effect of failure. Collective efficacy is theorized to have an even greater effect on performance after failure, particularly for successful teams. Bandura (2000) contends that an efficacious group will be more resilient in the face of adversity. As mentioned early, Hodges and Carron (1992) found that high efficacy groups actually improved their performance on Trial 2 after losing to a confederate group on Trial 1. Interestingly, performance effects were evidenced even though high efficacy triads demonstrated a much greater drop in performance expectations for Trial 2 than low efficacy groups. In this case, they were less confident but exerted more effort (i.e., groups were more

motivated). This suggests that a more general feeling of efficacy may be driving performance more than specific task ratings, at least following failure.

Collective Efficacy and Performance-Enhancing Behavior

Collective efficacy is theorized to influence performance by affecting the intensity, persistence and direction of group behavior (Bandura, 2000). Highly efficacious groups often perform better because they apply more effort, persist longer at difficult tasks, and set higher standards for performance. Efficacy beliefs are also hypothesized to influence the development of other performance-enhancing behaviors such as the use of effective strategies and greater coordinative processes. Here again, efficacious groups are expected to outperform inefficacious groups partly because they coordinate resources more effectively and apply better strategies. Yet, only a few studies have investigated the effect of collective efficacy on these intervening variables.

Collective efficacy and persistence. Locke and Latham (1990) define persistence as “effort maintained over time... typically measured in the form of time spent at an activity or the equivalent, such as number of attempts to solve a problem” (p.90). Efficacy theorists claim that task persistence is partially determined by performance expectations. If group does not expect to be successful, it is unlikely they will spend much time or effort on a particular problem.

Research on self-efficacy has demonstrated that feelings of efficacy can result in individuals spending more time on tasks (Bandura & Cervone, 1983; 1986) and on prescribed coping behaviors (Wood & Bandura, 1989). Self-efficacy research has also shown that efficacious individuals are particularly persistent after failure (Bandura,

1997). Few studies on collective efficacy have specifically examined persistency.

Hodges and Carron (1992) found that compared to low efficacy triads, high efficacy triads spent more time lifting a medicine ball after failing to defeat their opponent.

Collective efficacy and goal setting. Collective efficacy is also expected to affect group performance indirectly through goal setting. Goal setting theorists contend that “goals are important regulators of human action” (Weldon & Weingart, 1993, p.308). They affect performance by directing behavior toward an objective. They influence motivation by setting guidelines for the amount of effort required to reach that objective. Indeed, goals provide a normative standard for expected performance. Therefore, it follows that individuals with higher performance expectations will set higher standards. Self-efficacy studies have demonstrated that highly efficacious individuals set higher goals and are more committed to these goals (Locke & Latham, 1990; Wood & Bandura, 1989). The relationship between self-efficacy and goal setting is also supported from research on assigned goals. Studies have found that assigned goals affect participants’ levels of self-efficacy. Individuals given challenging goals were more efficacious than those assigned modest goals (Meyer & Gellatly, 1988; Wood & Bandura, 1989).

In terms of performance, studies on goal setting have consistently demonstrated a positive relationship between goals and individual outcomes (see Locke & Latham, 1990, for a review). These performance effects seem to occur at the group level as well. Studies have found that specific and challenging goals lead to greater performance than no goals, easy goals, or “do your best goals” (Weldon & Weingart, 1993). Goal setting theorists contend this “group goal effect is robust across tasks, setting, the method used to

set the goal, and goals for quantity, quality, and speed” (Weldon & Weingart, 1993, p.308).

Yet, less is known about the relationship between group goal setting and collective efficacy and their combined effects on performance. Research on self-efficacy points to group goal choice as a potential link between a group’s efficacy beliefs and their performance. In one of the few studies on group goal setting and collective efficacy, Mulvey and Klein (1998) found that groups rated higher in collective efficacy set more challenging goals, were more committed to these goals, and also performed better on an academic task than low-efficacy groups. They also found that goal processes (difficulty and commitment) partially mediated the relationship between a group’s efficacy assessments and their overall performance. Prussia and Kinicki’s (1996) brainstorming study provided further support for a positive association between collective efficacy and goal setting. In this case, high efficacy groups set more difficult goals (i.e., predicted they would generate more unique ideas) than low efficacy or control groups. They also found that collective efficacy partially mediated the relationship between performance feedback and goal setting. Overall, these results suggest that groups rely heavily on performance capability perceptions when making decisions on goal level.

Collective efficacy and coordination processes. Theoretically, beliefs about performance capability are proposed to impact a group’s ability to coordinate activities required for task accomplishment (i.e., as teams become more confident, they should become more motivated to collaborate toward collective outcomes). In the only study to examine this relationship, Marks (1999) found a positive relationship between collective

efficacy assessments and ratings of team coordination but only in routine environments.

Collective Efficacy and Physiological and Emotional Arousal

Finally, the positive effects on performance may also be due to the relationship between efficacy perceptions and reaction to stress. In a study on Army teams, Jex and Bliese (1999) found that group-level efficacy was negatively related to both psychological strain and negative physical symptoms (e.g., “headaches”, “stomach intestinal upset”). Efficacious teams were also more satisfied and more committed to their work, suggesting that strong performance expectations may be related to the development of performance-enhancing attitudes as well as behaviors.

CHAPTER 4

PURPOSE OF PRESENT RESEARCH

Although current research has provided evidence linking group efficacy and group functioning in a variety of settings (athletic, organizational, academic), the specific nature of this relationship has yet to be determined. The correlational method of most studies does not provide a basis for establishing a potential causal relationship between collective efficacy and performance. Correlational designs are particularly susceptible to confounding effects. Indeed, the relationship between group efficacy and group performance may be due to a third variable, such as personality characteristics of group members or the social context in which the group performs. More empirical work is needed to establish a clear understanding of collective efficacy and group performance. One of the major goals of the current study was to manipulate collective efficacy in an experimental setting.

The few studies that have manipulated efficacy suggest that group efficacy does affect performance but these performance effects vary depending upon the situation. Indeed, task seems to be critical factor. As mentioned previously, Prussia and Kinicki's (1996) findings imply that collective efficacy can have an immediate effect on creativity tasks. Yet, research on physical tasks (Hodges & Carron, 1992; Feltz & Lirgg, 1998) suggests performance effects may not be seen until later. Indeed, Feltz and colleagues (as cited in Hodges & Carron, 1992) found that a team's efficacy beliefs were more

predictive of athletic performance (e.g., hockey team's performance) at the end of the season. This study attempted to clarify the relationship between group efficacy and immediate performance by again examining its effect on a brainstorming task. But since the impact on other types of problems is not yet known, this study also considered the role of collective efficacy on a problem-solving task, specifically a verbal linguistic problem. Previous research on self-efficacy has found that individuals' performance expectations affect their immediate performance on linguistic problem solving, such as an anagram task (Feather, 1966; Sanna, 1997). The fact that Hodges and Carron (1992) failed to find an effect on immediate performance may also be due to their use of a competitive setting (e.g., groups competed against a confederate group). The presence of competition may neutralize the effect of the manipulation. In Prussia and Kinicki's (1996) study, groups worked alone on the task. The present research also investigated the effect of collective efficacy on performance on a problem-solving task in a noncompetitive setting (i.e., single groups working on an anagram task).

It may also be true that, at least for some tasks, performance effects do not emerge until later in a group's life span. Unfortunately, only a few experiments have considered how collective efficacy develops over time. Most paradigms have been limited to single assessments of efficacy prior to performance measures. This approach does not provide an adequate picture of the dynamic nature of collective efficacy or its effects on group functioning across a team's tenure. Real groups are not static. Indeed, efficacy beliefs are expected to change as group members gain more experience, become more knowledgeable about other members' strengths and weakness and receive performance

feedback. Without adequate research, however, it is unclear whether feelings of efficacy continue to escalate (decline) after repeated success (failure) or reach a leveling off point. An extremely efficacious group may fall victim to complacency or social loafing. Lindsley, Brass, and Thomas (1995) warn that "consistent prior success fosters decreased search and attention, increased complacency, and maladaptive homogeneity" (p.650). Further examination of the long-term effects of emerging efficacy beliefs on group functioning is needed. In one of the few studies to measure efficacy at several points in time, Hodges and Carron (1992) found that efficacy expectations decreased after failure. Interestingly, high efficacy groups exhibited more of a decrease than low efficacy groups. However, this decline had no effect on performance. High efficacy groups improved their performance after failure. These findings suggest that prior performance affects various levels of collective efficacy differently. With that in mind, the current study assessed a group's efficacy perceptions at different stages of performance.

Bandura (1997) argues that efficacy is "commonly misconstrued as being concerned solely with specific behaviors in specific situations" (p.49). He maintains that there are three levels of efficacy assessment--specific, intermediate, and global (Bandura, 1997). Despite this fact, experimental research has primarily concentrated on the effect of specific efficacy (i.e., expectations for certain levels of performance on a future task) on performance. The typical experimental paradigm examines group efficacy using the same task. Yet, actual groups rarely perform the same tasks over and over again. Most groups engage in series of similar tasks pertaining to an overall objective. Although

Bandura (1997) allows for an intermediate level of assessment “for a class of performances within the same activity domain under a class of conditions sharing common properties” (p.49), few studies have examined the effect of this intermediate level on performance. Research on self-efficacy suggests that the effect of performance expectations may generalize to actions other than the target behavior (Bandura, 1977, 1980). Therefore, this study utilized a sequence of different tasks in order to determine how feedback on related tasks affects perceptions of future performance on new tasks.

As previously noted, most studies have limited assessments of collective efficacy to one of two formats. One method measures efficacy in terms of group members’ ratings of confidence in attaining certain levels of performance. The other method relies on member’s perceptions of their group’s overall efficacy (e.g., the group’s ability to be effective, to work together, to coordinate resources etc.,). Researchers have rarely used both assessments in a single study. Little is known how these two assessments might interact to produce group outcomes. With that in mind, the current design assessed both a group’s general level of efficacy as well as their more task specific performance expectations.

More experimental research is also needed on outcomes other than overall performance. Group efficacy is theorized to affect goal setting, task persistence and performance after failure. But research has yet to specifically investigate persistence. Goal setting studies rarely manipulate efficacy and only one study (Hodges & Carron, 1992) has experimentally manipulated the effect of failure on perceptions of efficacy and performance. The proposed experiment will consider the impact of efficacy

manipulations on goal setting. This study also created a failure experience in order to investigate how groups with different levels of efficacy respond to failure.

Finally, this study offers the potential to explore the mediating role of collective efficacy on the relationship between performance feedback and overall performance. In theory, efficacy perceptions are proposed to mediate the relationship between contextual information (e.g., performance feedback, proficient models) and motivated behavior. Yet only a few studies have investigated mediation. Prussia and Kinicki (1996) demonstrated that performance feedback relates to group functioning through efficacy perceptions. Mulvey and Klein (1998) found that group goal processes partially mediated the relationship between collective efficacy and overall performance. The current study examined whether a group's performance expectations mediate the relationship between feedback and overall performance.

Overview of Current Study

The current experiment investigated the effect of collective efficacy on three group-level outcomes—goal setting, task persistence, and overall performance. Groups were randomly assigned to experimental conditions (i.e., high collective efficacy, low collective efficacy or control condition). Conditions were manipulated using false feedback, a method that has proved successful in generating efficacy in other studies (Prussia & Knight, 1996; Hodges & Carron, 1992). Groups in each condition performed a series of four cognitive tasks -- an analogy task, a brainstorming task, an analytical reasoning task, and an anagram task. False feedback was provided at three points during the sequence-- after the analogy task, brainstorming task, and analytical reasoning task.

Collective efficacy was measured at both the general and task specific level. General efficacy was assessed using the same measure at four points during the experiment (i.e., immediately following task completion). Task specific efficacy was assessed three times, each immediately following performance feedback on the previous task. Specific ratings gauged perceptions about performance for the next task in the sequence.

A series of tasks was also used in order to investigate how efficacy develops over time. Performance on Task 2 and Task 4 were used to examine the effect of the efficacy manipulations on task performance. Performance was measured in terms of number of ideas generated (Task 2) and number of correct answers (Task 4). Time spent problem solving was used to measure persistence on Task 4. All groups failed the third task (an extremely difficult analytical reasoning task) in order to examine how failure affects efficacy perceptions and performance on a subsequent task (an anagram task). Groups were also asked to set a goal for their performance on the fourth and final task in order to investigate the effect of efficacy expectations on goal setting.

Predictions

The forthcoming section outlines the study's hypotheses as they apply to the study's measured variables – general efficacy, task specific efficacy, goal setting, task persistence and overall performance. Predictions are made based on the feedback manipulation (i.e., positive, negative, control).

General efficacy. At the very basic level, I expected that performance feedback, albeit bogus, would affect a group's perception of general efficacy. Positive feedback should enhance a group's general level of efficacy while negative feedback should

degrade a group's belief in their ability to be effective. With the exception of the initial rating that occurred prior to feedback, differences between conditions were expected at each measurement, with high efficacy groups recording the highest ratings followed by control groups followed by low efficacy groups.

The effect of repeated exposure to feedback was expected to affect each condition differently. For groups receiving positive feedback (i.e., the high efficacy condition), recordings of general efficacy should escalate across assessments (from 1 to 2) except for immediately following Task 3 (i.e., assessment 3). Although at this point groups have received positive feedback on Task 1 and 2, they have just completed an extremely difficult problem-solving task (one in which groups were designed to fail). As such, task difficulty should water down the effects of consecutive positive feedback. General efficacy ratings were expected to increase again on the final measure (i.e., assessment four). For groups receiving negative feedback (i.e., low collective efficacy condition), general efficacy ratings were predicted to decline across measurements. Including "failure" on Task 3, these groups were exposed to three negative performance ratings, thereby, decreasing their beliefs of effectiveness over time. Finally, without the presence of feedback, control group ratings should remain fairly stable across assessments, although Task 3's difficulty may result in a decline in ratings on the third assessment.

Task specific efficacy. A similar pattern was predicted for groups' task specific efficacy ratings. In short, feedback on previous performance was expected to influence performance expectations for the upcoming task. Positive feedback should enhance a group's confidence level for attaining certain levels of performance while negative

feedback should decrease performance expectations. As such, high efficacy groups were expected to report stronger performance expectations at each measurement than low efficacy groups. Considering the evidence that without feedback groups tend to rate their ability above average (Paulus, Dzindolet, Poletes, & Camacho, 1993), control groups' ratings should be higher than low efficacy groups. This positive bias may dilute differences between controls and high efficacy groups especially on the initial assessments.

Similar to general efficacy, the effect of repeated exposure to performance feedback on specific efficacy assessments was expected to affect each condition differently. For groups receiving positive feedback, specific performance expectations should increase from the first assessment (ratings for success on the brainstorming task) to the second assessment (ratings for the analytical reasoning task). Failure on the analytic reasoning problem (Task 3) should decrease specific ratings for performance on Task 4. Specific efficacy ratings for low efficacy groups (i.e., negative feedback) were expected to decrease across assessments. Finally, control ratings should remain fairly constant across measurements.

Goal setting. I also predicted that efficacy condition would affect goal choice on Task 4 (the anagram task). Specifically, high efficacy groups should select more challenging goals (in terms of predicted correct out of 20) than controls or low efficacy groups. Control groups were also expected to set higher goals than low efficacy groups.

Failure experience. Failure on Task 3 was expected to negatively influence performance expectations (task specific efficacy) for Task 4. The difficulty of Task 3

should also affect general efficacy ratings measured immediately following performance. Failure on Task 3, however, should not affect performance measures on Task 4. High efficacy groups were still expected to devote more time problem solving and solve more problems than low efficacy groups.

Task persistence. Efficacy manipulations were also expected to impact persistence on Task 4. High efficacy groups should devote more time to the anagram task than controls or low efficacy groups. Condition should also affect the amount of time spent solving the three unsolvable anagrams included in the task, with the most time allocated by high efficacy groups followed by control followed by low efficacy groups.

Overall performance. Performance was measured on two tasks – the brainstorming task and the anagram task. It was hypothesized that high efficacy groups and control groups would generate more ideas and solve more anagrams than low efficacy groups. High efficacy groups should also outperform control groups on these tasks.

Relationships between measured variables. Finally, it was hypothesized that both general and specific efficacy ratings would be positively associated with a group's goal level, task persistence, and overall performance. Both goal setting and persistence were expected to be related to number of anagrams solved on Task 4. Finally, task specific efficacy should mediate the relationship between performance feedback and overall performance.

CHAPTER 5

METHODS AND PROCEDURES

Participants

Two hundred and twenty-five undergraduates from Loyola University Chicago participated in this study. Participants were run in 3-person groups and each group was randomly assigned to experimental conditions. All students received course credit for their participation.

Design

The primary purpose of this study was to investigate the effect of collective efficacy on group functioning. Collective efficacy (high vs. low vs. control) was manipulated by false performance feedback. The primary dependent variables were goal choice, task persistence, and overall performance. A secondary goal was to examine the effect of experimental manipulations on two types of efficacy assessments – general efficacy and task specific efficacy.

Materials

Experimental tasks. Each group participated in a series of four tasks -- an analogy task, a brainstorming task, an analytical reasoning task, and an anagram task. The same task sequence was used for all groups. Appendix A contains examples of the four experimental tasks used in the study. Task 1, the analogy task, consisted of a 40 question

multiple choice analogy test. Groups were told to complete as many questions as possible in a 15-minute period. The analogies were selected from GRE practice manuals. To ensure the task included an equal distribution of easy, medium, and difficult problems, all items were pilot tested prior to study. It was important that the task included an appropriate range of difficulty in order to keep performance feedback relatively ambiguous. The task was also extremely difficult (40 analogies in 15 minutes) in order to prevent groups from interpreting their own performance in positive or negative terms. The selected task allowed groups to enjoy some success but not so much that they were able to evaluate performance in positive or negative terms. This was critical if groups were going to believe the feedback manipulations.

Groups also participated in a brainstorming task (Task 2). Groups were given 15 minutes to generate ideas for reducing the number of traffic accidents in major cities (e.g., “what can be done to reduce the number of traffic accidents in the US major cities?”). The task was pilot tested to ensure that such a problem could keep groups generating ideas for the entire 15-minute period. It was important that potential differences in idea-generation were driven by motivational causes (e.g., group decided to stop brainstorming) as opposed to task parameters (e.g., it only takes 10 minutes for the average group to come up with the maximum number of solutions to the problem).

Task 3 required groups to solve an exceptionally difficult analytical reasoning problem in 15 minutes. This task served to create a failure experience for all groups. The task was pilot tested to ensure that the likelihood of a group solving the problem was extremely low.

Finally, groups participated in an anagram task (Task 4). Each group was given

the remainder of the experimental session to work on a set of 20, five-letter anagrams. The anagrams were selected from a set used in a previous study (Gilhooly & Johnson, 1978). By design, the task included a set of easy, moderate and difficult anagrams according to solution scores obtained from Gilhooly and Johnson (1978). The anagrams were also pilot tested to ensure an appropriate range of difficulty. The set also included three exceptionally difficult (“malae”, “nidus”, “kylix”) and three unsolvable anagrams (“cinai”, “groyu”, “pusda”) in order to measure task persistence.

Collective efficacy manipulation. False feedback from each of the first two tasks in the sequence served as the primary efficacy manipulation. Performance feedback was used to provide groups with a basis for developing expectations about their group’s future performance (i.e., task specific efficacy) and for developing perceptions about their group’s overall effectiveness (i.e., general efficacy). Use of performance feedback as a means to manipulate collective efficacy is consistent with previous research (Prussia & Kinicki, 1996; Hodges & Carron, 1992). Moreover, performance feedback is theorized to be a primary determinant of collective efficacy (Bandura, 1997).

Following completion of each task, groups received objective feedback regarding their actual performance (e.g., “your group’s total score was 10 out of 20”) but false feedback regarding their normative performance (e.g., “that’s really good. Compared to other groups working on this task, your group scored in the top 20th percentile”). In order to prevent groups from recognizing the false nature of the feedback, a different percentile rank was used for each of the first two tasks. Groups in the high efficacy condition were told that their performance was in the top 20th percentile on the first task, and the top 25th percentile on the second task. In contrast, groups in the low efficacy condition were told

that their performance was in the bottom 20th percentile on the first task, and the bottom 25th percentile on the second task. Groups in the control condition did not receive performance feedback and were told that providing feedback on previous tasks might interfere with their performance on subsequent tasks.

Failure experience. Since a secondary goal of this study is to examine the effect of failure on efficacy perceptions and group behavior, all groups failed the third task in the sequence. Both the high and low efficacy groups were told that they failed to successfully complete the exercise (e.g., “Your group’s answer was incorrect”). The experimenter also allowed them to review the correct solution (see Appendix A) and provided false information regarding the normative standard of performance (e.g., “50% of the previous groups have solved this problem”).

Collective efficacy assessment. Collective efficacy was assessed in two ways. The first assessment was designed to gauge a group’s general level of efficacy (see Appendix B). Prior to receiving feedback on Task 1, Task 2, and Task 3, each group member answered a questionnaire. The questionnaire asked group members to rate their group and other group members on several indices of performance (i.e., effectiveness, skill, ability to work together effectively etc.). Group members answered the same questionnaire each time.

The second method gauged a group’s efficacy for a particular task (see Appendix C). Assessments were designed to measure performance expectations for attaining certain levels of performance on upcoming tasks. Task specific efficacy was measured immediately following feedback on previous performance. Prior to Task 2 (the brainstorming task), for example, group members were asked to rate how confident they

were that their group would attain each of four levels of performance (e.g. “I am _____ confident that my group will perform as well as other groups have on these type of tasks”, “I am _____ confident that my group will perform somewhat better than other groups on these type of tasks”). Prior to Task 3 (the analytical reasoning problem), group members were asked to rate how confident they were that their group would solve the problem (e.g. “I am _____ confident that my group will solve the analytical reasoning problem”). Prior to Task 4 (the anagram task), group members were asked to rate how confident they were that their group would reach five different performance levels (e.g., “I am _____ confident that my group will solve at least 4 anagrams”; “I am _____ confident that my group will solve at least 16 anagrams”).

For all three assessments, confidence was measured using a scale from 0 (no confidence at all) to 100 (totally confident). Responses on individual items were averaged to create a group member score. Group member’s scores were then aggregated to create an overall specific efficacy score for that task. This approach is consistent with Bandura’s suggestions for measuring collective efficacy and has been widely used in other efficacy research (Prussia & Kinicki, 1996; Lee & Bobko, 1994; Bandura & Jourden, 1991).

Goal setting assessment. Each group was asked to set a goal for their expected performance on Task 4 (see Appendix D). The measure was completed as a group, immediately following the task specific efficacy assessment.

Procedure

On arrival, participants were told that the purpose of the experiment was to better

understand how groups perform on cognitive tasks. After signing consent forms, groups engaged in the following experimental sequence.

First, groups were asked to complete a multiple choice analogy test. They were given the following instructions, "In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. As a group, select the lettered pair that best expresses a relationship similar to that expressed in the original pair. You will have 15 minutes to complete this task. Finish as many of the questions as you can. Are there any questions?" After completing the task, each group member completed the general efficacy questionnaire. While groups completed this assessment, the experimenter 'graded' the analogy test. After all group members were finished, the experimenter provided the group with feedback (objective and false) concerning their performance. False normative feedback was administered according to condition. For example, groups in the high collective efficacy condition were told, "Your total group was _____ out of 20. That's very good. Compared to other groups working on this task, your group scored in the 20th percentile". Groups in the control condition did not receive feedback. After receiving this feedback, each group member was informed of the group's next task and answered questions related to his or her expectations for their group's performance (the task specific efficacy assessment).

Next, each group engaged in a brainstorming task. They were told that they would have 15 minutes to generate as many ideas as possible to the problem of reducing traffic accidents in major cities. Each group was also given a written copy of the problem. After completing this second task, each group completed the general efficacy questionnaire while the experimenter 'graded' the group's performance on the

brainstorming task. False feedback was provided and performance expectations (i.e., task specific efficacy) were assessed using similar procedures as Task 1.

Next, each group was given 15 minutes to solve an analytical reasoning problem. This problem-solving task was extremely difficult in order to generate a feeling of failure among the groups. After completing the task, group members completed the general efficacy questionnaire while the experimenter 'graded' their performance. After each group member was finished, groups were given feedback regarding their performance, specifically that they failed to solve the problem. The experimenter informed the groups of the correct answer and provided false information regarding the normative standard of performance (e.g., "50% of the previous groups have solved this problem"). After receiving this feedback, each group member was informed of the next task and answered questions related to their expectations for their group's performance (task specific efficacy).

For the final task, each group worked on a set of 20 anagrams. They were given the remainder of the experiment time to complete as many anagrams as possible. Each group was given the following instructions, "Next, we would like your group to attempt to solve a series of anagrams. Anagrams are simple words that have had their letters scrambled. The task is to de-scramble the letters in order to figure out what the word is. The anagrams listed vary in difficulty -- some are easy, some moderate, some are extremely difficult. Try your best to find a solution to each anagram. Though some of the anagrams are quite difficult, all have solutions. Please write your answer on the space provided. Any questions?" After informing the experimenter they were finished problem solving, each group member completed the general efficacy questionnaire.

Finally, groups were debriefed about the goal of the study, the true nature of the feedback, and the reasons behind the deception.

CHAPTER 6

RESULTS

Descriptive Statistics

All summary statistics are reported at the group-level. Table 1 shows the means and standard deviations of all dependent variables by experimental conditions. Task 1 performance and the general efficacy assessment at Time 1 occurred prior to the performance feedback manipulation.

General Collective Efficacy

In order to examine the effects of the experimental manipulations and the experimental sequence on members' assessments of their group's general efficacy level, members' completed the same assessment (see Appendix B) immediately following performance of each task (four assessments total). The mean of the individual members' responses was used to produce a group's general efficacy score at each time interval. Higher scores reflected stronger ratings of effectiveness, with a score of 63 representing the highest possible score.

It was hypothesized that general efficacy ratings would differ between conditions (i.e., overall, high efficacy groups would record higher ratings than low efficacy groups) and vary depending upon time of assessment. Ratings were expected to be similar at Time 1 but differ depending upon condition beginning at Time 2. Specifically, ratings for high efficacy groups were predicted to peak at Time 2, slightly decrease at Time 3

Table 1

Means and Standard Deviations of All Study Variables as a Function of Efficacy Condition

Variables	All Groups (n=75)		High Efficacy (n=25)		Low Efficacy (n=25)		Control (n=25)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
General Efficacy								
Time 1*	48.41	5.08	49.21	4.12	47.23	5.20	48.80	5.77
Time 2	53.67	5.23	54.99	3.90	51.12	5.73	54.89	5.11
Time 3	46.91	6.58	48.31	4.43	43.09	7.28	49.32	6.12
Time 4	50.76	5.43	52.71	3.79	46.93	5.45	52.63	4.90
Specific Efficacy								
Time 1 (for task 2)	65.03	16.08	76.13	8.41	48.85	12.55	70.10	11.88
Time 2 (for task 3)	73.71	14.49	80.27	8.71	60.47	14.68	80.40	9.03
Time 3 (for task 4)	66.99	12.64	71.41	7.92	57.52	13.87	72.04	9.86
Goal for Task 4	12.32	3.71	12.52	4.42	10.84	4.30	13.6	2.89
Task 4 Persistence								
Overall time	1648.09	547.00	1868.68	570.03	1371.80	322.05	1703.80	600.40
Time on unsolvable	659.24	299.22	732.41	287.96	478.15	175.50	772.05	333.77
Performance								
Task 1*	13.81	4.47	15.52	4.21	12.84	3.01	13.08	5.51
Task 2	21.23	8.89	22.28	8.21	20.92	9.24	20.48	9.46
Task 3	--	--	--	--	--	--	--	--
Task 4	12.71	1.67	12.84	1.46	12.24	1.85	13.04	1.62

Note. Dashes indicate score was not calculated because per design, all groups failed task 3. * Items accomplished prior to experimental manipulations.

and increase again at Time 4. For low efficacy groups, ratings were predicted to steadily decline across measurements. Finally, ratings for control groups were expected to remain fairly stable throughout the experimental sequence.

Predictions were analyzed using a 3 (condition) X 4 (time of measurement) ANOVA with repeated measures on the last factor. A significant main effect of condition was obtained, $F(2,72) = 8.688$, $p < .0001$, with high efficacy ($M = 51.30$) and control groups ($M = 51.41$) reporting higher ratings of overall effectiveness or general efficacy than low efficacy groups ($M = 47.09$). There was also a significant main effect for time of measurement, $F(3, 216) = 47.150$, $p < .0001$. Overall, as seen in Table 1, groups' ratings of effectiveness increased from Time 1 to Time 2, decreased at Time 3 and rose again at Time 4. Finally, a significant condition X time interaction was obtained, $F(6, 216) = 2.314$, $p = .035$, with low efficacy groups exhibiting less of an increase in efficacy ratings from Time 1 to Time 2 and more of a decrease in efficacy ratings from Time 2 to Time 3 than high efficacy and control groups. Change in ratings from Time 3 to Time 4 were similar for all groups (see Figure 1).

To pinpoint differences in general efficacy between conditions at each point in time, simple effects and post hoc analyses were performed. As predicted, significant differences between conditions did not emerge until Time 2. Post-hoc Tukey HSD tests revealed significant differences between high efficacy and low efficacy conditions ($p < .05$), with high efficacy groups reporting higher ratings than low efficacy groups. Significant differences were also found between control and low efficacy conditions ($p < .05$), with controls exhibiting higher ratings than low efficacy groups. Controls and high

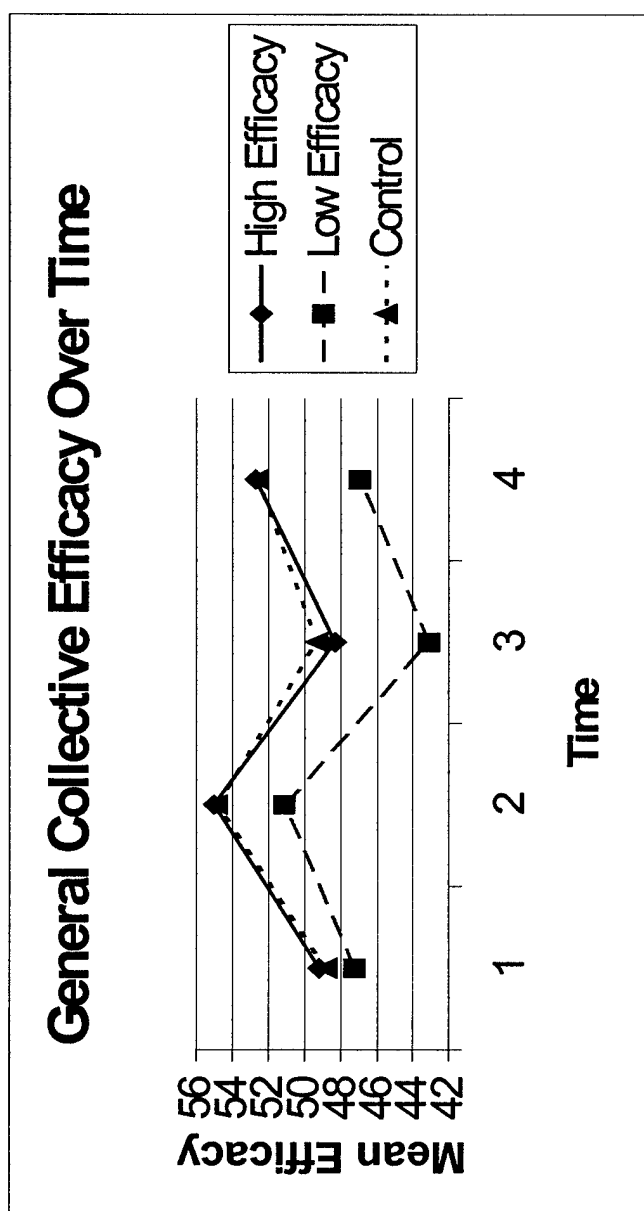


Figure 1. General collective efficacy over time

efficacy conditions reported similar ratings. Time 3 analyses revealed a similar pattern. Post-hoc Tukey HSD tests demonstrated that high efficacy groups recorded significantly higher ratings than low efficacy groups, $p < .05$. Differences were also found between control and low efficacy conditions, with controls reporting higher ratings than low efficacy groups, $p < .05$. Again, differences between controls and high efficacy groups were not significant. Finally, at Time 4, significant differences were found between conditions. Tukey HSD comparisons revealed significant differences between high efficacy and low efficacy conditions ($p < .05$) and between controls and low efficacy conditions ($p < .05$) but no differences between high efficacy groups and controls. Means are reported in Table 1 and F-values are reported in Table 2.

Table 2

Analysis of Variance for Mean General Efficacy at Each Time Interval

Source	df	<u>F</u>			
		Time 1	Time 2	Time 3	Time 4
Condition	2	1.067	4.922*	7.605*	12.074**
Error	72	(25.746)	(24.716)	(36.694)	(22.690)

Note. Values in parentheses represent mean square errors.

* $p < .05$, ** $p < .01$.

To further examine the effect of experimental manipulations on general efficacy assessments, effect size analyses were conducted. Both high and low efficacy ratings were compared against control ratings at each assessment (general efficacy at time 1 was not included since it occurred prior to manipulations). In general, manipulations had

medium to large effects (according to Cohen's criteria) on low efficacy groups and rather negligible effects on high efficacy groups (see Table 3). For the low efficacy group in particular, effect sizes increased over time.

Table 3

Effect Size Analysis: High and Low General Efficacy Ratings Versus Control Ratings

Source	d		
	Time 2	Time 3	Time 4
High Efficacy	.020	.165	.016
Low Efficacy	.500	1.01	1.15

Specific Collective Efficacy

In order to investigate the effect of performance feedback on a group's performance expectations for subsequent tasks, group members indicated their confidence in successfully completing various levels of performance prior to each task (see Appendix B for assessments). Individual members' responses on performance levels were averaged to assess overall group member confidence and then aggregated to produce each group's specific efficacy score for each task. Although each assessment targeted different tasks, all used a 0 to 100 scale, with higher scores indicating stronger performance expectations for the task.

It was hypothesized that specific efficacy ratings would differ between conditions, with high efficacy groups recording the highest ratings followed by controls and then, low efficacy groups. Specific efficacy ratings were expected to vary across time

depending upon condition. For high efficacy groups, ratings were expected to peak at Time 2 followed by a slight decrease at Time 3 (i.e., following failure feedback). In contrast, low efficacy groups' confidence levels were expected to decline over time. Finally, control groups' ratings were predicted to remain fairly consistent throughout the experiment.

Specific efficacy scores obtained prior to each task were analyzed using a 3 (condition) X 3 (time of measurement) ANOVA with repeated measures on the last factor. As predicted, a significant main effect for condition was obtained, $F(2, 72) = 40.217, p < .0001$, with both high efficacy and control groups reporting stronger performance expectations than low efficacy groups (see Table 1 for mean values). There was also a significant main effect for time, $F(2, 144) = 24.237, p < .0001$. Overall, performance expectations increased from Time 1 to Time 2 but declined from Time 2 to Time 3 (see Table 1). Finally, a significant condition X time interaction was obtained, $F(4, 144) = 4.645, p = .001$, with low efficacy groups exhibiting more of an increase in specific ratings from Time 1 to Time 2 and less of a decrease from Time 2 to Time 3 than high efficacy and control groups. High efficacy and controls exhibited similar patterns of change in efficacy across time (see Figure 2).

Once again, simple effects and post hoc comparisons were examined. The simple effects F ratios are reported in Table 4 and means are presented in Table 1. As predicted, significant differences among condition were found at Time 1 (after receiving feedback on the analogy task). A post-hoc Tukey HSD test revealed that both high efficacy and control groups reported stronger performance expectations than low efficacy groups,

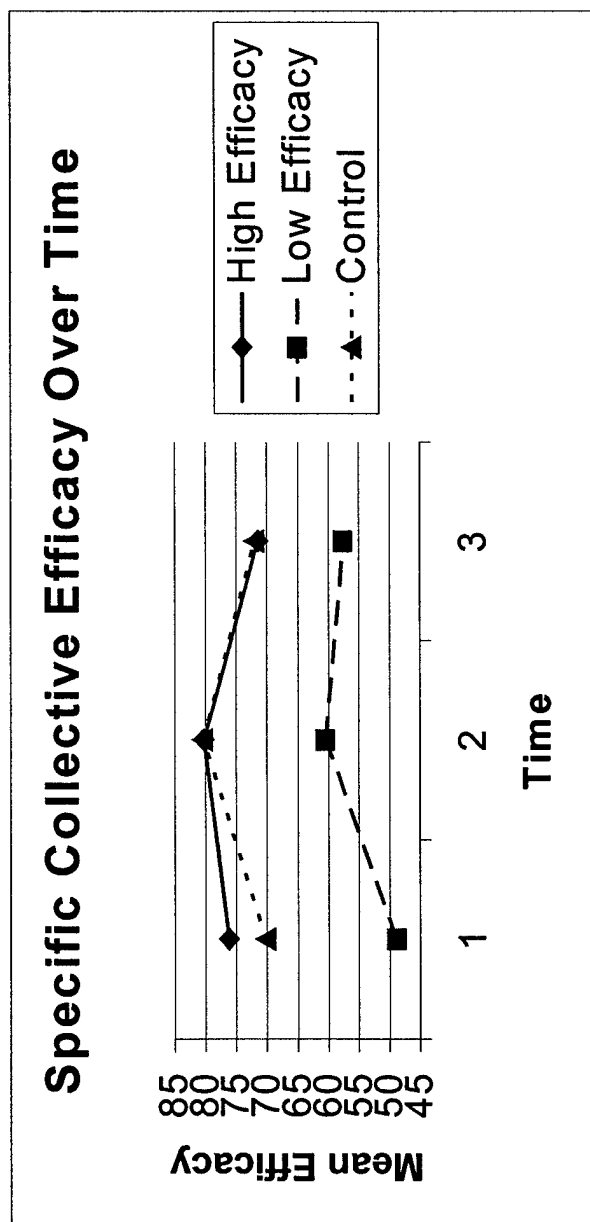


Figure 1. Specific collective efficacy over time

$p < .0001$. Differences between control and high efficacy groups were not significant ($p = .139$). At Time 2 (i.e., after receiving brainstorming feedback), a similar pattern emerged. A significant main effect for condition was obtained. Specifically, results of a post-hoc Tukey HSD test indicated that both high efficacy and control groups reported stronger performance expectations than low efficacy groups, $p < .0001$. High efficacy and controls expressed similar expectations ($p = .999$). Finally, Time 3 (after failing the analytical reasoning task) analyses resulted in a significant main effect for condition. A post-hoc Tukey HSD test revealed significant differences between high efficacy and low efficacy groups, $p < .0001$, as well as controls and low efficacy groups, $p < .0001$. Differences between high efficacy and control conditions were not significant ($p = .977$).

Table 4

Analysis of Variance for Mean Specific Efficacy at Each Time Interval

Source	df	<u>F</u>		
		Time 1	Time 2	Time 3
Condition	2	41.720**	26.452**	14.342**
Error	72	(123.098)	(124.3443)	(117.474)

Note. Values in parentheses represent mean square errors.

* $p < .05$, ** $p < .01$.

Effect size analyses were also conducted on task specific efficacy assessments. Compared to controls, manipulations had large effects on low efficacy groups and small to medium effects on high efficacy groups (see Table 5).

Table 5

Effect Size Analysis: High and Low Specific Efficacy Ratings Versus Control Ratings

Source	d		
	Time 1	Time 2	Time 3
High Efficacy	.510	.014	-.197
Low Efficacy	-1.79	-2.14	-1.47

Relationship between General and Specific Efficacy

Although the two assessments tapped different perceptions of a group's functioning (e.g., general beliefs about the group's ability to work together vs. confidence in reaching certain performance levels), as expected, the two assessments were positively associated throughout the experiment. For example, specific efficacy at Time 1 was significantly correlated with general efficacy at Time 2 ($r = .534, p < .0001$), Time 3 ($r = .592, p < .0001$) and Time 4 ($r = .589, p < .0001$). A similar pattern emerged between specific efficacy for Time 2 and Time 3 and general efficacy assessments at other points in the experimental sequence (see Table 6).

In terms of each individual assessments' consistency, it was predicted that specific efficacy at Time 1 would be correlated with specific efficacy at Time 2 and so on. This also held for general efficacy assessments (see Table 6).

Table 6

Group-level Correlations Between Collective Efficacy, Goal Setting, Persistence, and Performance for All Groups

Variables	1	2	3	4	5	6	7	8	9	10	11	12
General Collective Efficacy												
1. time 1	--	.493**	.450**	.489**	.449*	.470**	.262*	.126	.304**	-.085	.099	-.053
2. time 2		--	.597**	.649**	.534**	.646**	.425**	.106	.293*	-.039	.350**	.108
3. time 3			--	.624**	.592**	.634**	.634**	.298**	.377**	-.028	.095	.120
4. time 4				--	.589**	.634**	.554**	.144	.382**	.014	.162	.288*
Specific Collective Efficacy												
5. time 1 (for task 2)					--	.742**	.602**	.295*	.395**	.160	.047	.080
6. time 2 (for task 3)						--	.663**	.239*	.399**	.099	.270*	.228*
7. time 3 (for task 4)							--	.256*	.172	.120	.263*	.172
Goal Setting												
8. task 4 goal								--	.136	-.102	-.138	.133
Task Persistence												
9. time spent on task 4									--	.063	.175	.453**
Task Performance												
10. task 1 score										--	.300**	.123
11. task 2 score											--	.076
12. task 4 score												--

* $p < .05$, ** $p < .01$

Collective Efficacy and Goal Setting

In order to examine the effect of performance feedback and efficacy assessments on group goal setting, groups set a goal for their performance on the final task (e.g., number of anagrams out of 20). It was hypothesized that high efficacy and control groups would set higher goals than low efficacy groups. To assess this prediction, a one-way ANOVA was used. A significant main effect for condition was obtained, $F(2,72) = 3.770, p = .028$, with the highest goal setting displayed by controls followed by high efficacy groups followed by low efficacy groups (see Table 1). A post-hoc Tukey HSD test revealed that only the control and low efficacy groups differed significantly, $p = .022$. Although the difference between high and low efficacy groups was in the expected direction, it was not significant ($p = .228$).

To further investigate the relationship between collective efficacy and goal setting, correlations between specific efficacy assessments and goal choice were examined. In this case, efficacy assessments (i.e., confidence in attaining performance levels) were expected to be positively associated with goal (i.e., the stronger a group's performance expectation, the higher the goal). Overall, performance expectations for the anagram task (task 4) were significantly correlated with goal setting ($r = .256, p = .027$) across groups. Goal choice was also significantly correlated with performance expectations for Task 1 ($r = .295, p = .01$) and Task 2 ($r = .239, p = .039$) across groups. At the condition level, the correlations between specific efficacy and goal setting were not significant with one notable exception (see Tables 7 through 9). Control groups' performance expectations for Task 4 and their goal choice for Task 4 were strongly

Table 7

Correlations Between Collective Efficacy, Goal Setting, Persistence, and Performance for the High Efficacy Condition

Variables	1	2	3	4	5	6	7	8	9	10	11	12
General Collective Efficacy												
1. time 1	--	.516**	.494*	.394*	.438*	.163	-.039	.202	.048	-.430*	-.205	-.197
2. time 2		--	.434*	.421*	.361	.340	.166*	.504*	.016	-.344	.378	-.127
3. time 3			--	.351	.279	.244	.132	.342	.164	-.064	-.036	-.018
4. time 4				--	.080	.269	.403*	.176	.186	-.049	.248	.319
Specific Collective Efficacy												
5. time 1 (for task 2)					--	.361	.179	.003	-.057	.011	-.199	-.205
6. time 2 (for task 3)						--	.492*	.210	.133	-.099	.296	.080
7. time 3 (for task 4)							--	-.048	-.288	.306	.351	-.037
Goal Setting												
8. task 4 goal								--	.159	-.124	.283	.001
Task Persistence												
9. time spent on task 4									--	-.313	-.004	.522**
Task Performance												
10. task 1 score										--	.181	.102
11. task 2 score											--	.052
12. task 4 score												--

* $p < .05$, ** $p < .01$

Table 8

Correlations Between Collective Efficacy, Goal Setting, Persistence, and Performance for the Low Efficacy Condition

Variables	1	2	3	4	5	6	7	8	9	10	11	12
General Collective Efficacy												
1. time 1	--	.326	.410*	.218	.317	.561**	.448*	.038	.225	.049	.368	-.166
2. time 2		--	.647**	.678**	.459*	.664**	.559*	-.202	.594**	-.081	.657**	.308
3. time 3			--	.680**	.584**	.769**	.696**	.193	.510**	-.242	.222	.278
4. time 4				--	.377	.493*	.530**	-.170	.222	-.074	.387	.164
Specific Collective Efficacy												
5. time 1 (for task 2)					--	.573**	.439*	.148	.175	-.099	.258	-.021
6. time 2 (for task 3)						--	.756**	.116	.394	.066	.526**	.248
7. time 3 (for task 4)							--	-.056	.354	.037	.532**	.276
Goal Setting												
8. task 4 goal								--	.230	.037	-.330	.266
Task Persistence												
9. time spent on task 4									--	-.021	.250	.352
Task Performance												
10. task 1 score										--	.095	-.015
11. task 2 score											--	.069
12. task 4 score												--

* $p < .05$, ** $p < .01$

Table 9

Correlations Between Collective Efficacy, Goal Setting, Persistence, and Performance for the Control Condition

Variables	1	2	3	4	5	6	7	8	9	10	11	12
General Collective Efficacy												
1. time 1	--	.599*	.424*	.783**	.671**	.644**	.060	.067	.451*	-.051	.037	.062
2. time 2		--	.437*	.569**	.476*	.668**	-.011	-.084	.112	.009	.040	-.181
3. time 3			--	.438*	.498*	.282	.512*	.106	.275	-.016	.046	-.251
4. time 4				--	.573**	.595**	.179	.130	.355	-.106	-.108	.229
Specific Collective Efficacy												
5. time 1 (for task 2)					--	.624**	.438*	.359	.389	.099	-.080	-.081
6. time 2 (for task 3)						--	-.106	-.177	.282	.065	.100	-.034
7. time 3 (for task 4)							--	.682**	.033	-.082	-.040	-.153
Goal Setting												
8. task 4 goal								--	-.186	-.302	-.313	-.166
Task Persistence												
9. time spent on task 4									--	.186	.284	.455*
Task Performance												
10. task 1 score										--	.482*	.205
11. task 2 score											--	.105
12. task 4 score												--

* $p < .05$, ** $p < .01$

associated ($r = .682, p < .0001$)

Goals have also been found to be associated with the amount of persistence directed toward a task and overall task performance (see Lock & Latham, 1990, for a review). As such, it was expected that groups' goal level would be positively associated with time spent on the anagram task as well as performance on the anagram task. At the overall level, correlations were in the predicted direction but not significant ($r = .136$ for persistence and $r = .133$ for performance, respectively). Correlations for both the high and low efficacy groups were also in the appropriate direction but not significant (see Table 7 and 8). Contrary to predictions, the relationships were in the opposite direction for control groups (see Table 9).

Collective Efficacy and Persistence

Overall time. The study also predicted that collective efficacy would influence performance through task persistence. As such, it was expected that high efficacy groups would persist longer on Task 4 (the only task in which groups were given an unlimited amount of time) than controls or low efficacy groups. A one-way ANOVA was run on the total time spent on Task 4. A significant main effect for condition was obtained $F(2,72) = 6.087, p = .004$ with high efficacy groups spending more time than controls or low efficacy groups (see Table 1). A post-hoc Tukey HSD test revealed a significant difference between high efficacy groups and low efficacy groups ($p = .003$) and a marginally significant difference between controls and low efficacy groups ($p = .064$). Differences between controls and high efficacy groups were not significant ($p = .495$).

Unsolvable anagrams. The anagram task included three unsolvable anagrams.

These anagrams were included to ensure that groups could not successfully finish the task in the allotted time but also to provide another measure of persistence. Similar to overall persistence, it was predicted that high efficacy groups would more time on the unsolvable anagrams followed by controls and finally, by low efficacy groups. Time spent on each anagram was measured using the videotaped portion of task performance. Due to recording difficulties, seven groups had to be dropped from the analysis. A one-way ANOVA was run on total time spent on the three anagrams. As expected, there was significant effect of condition, $F(2, 65) = 6.697$, $p = .002$. A post-hoc Tukey test indicated that both control ($M = 740.527$ seconds) and high efficacy groups ($M = 732.413$) spent significantly more time on these anagrams ($p = .006$ and $p = .007$, respectively) than low efficacy groups ($M = 478.152$). The post-hoc analysis revealed no significant differences between high efficacy and controls ($p = .995$).

The anagram task also included three extremely difficult anagrams (malae, kylix, and nidus). Only 11 groups were able to solve either "malae" or "kylix" and none of the groups were able to correctly identify "nidus". Due to this fact, time spent on "nidus" was added to the unsolvable group. Another one-way ANOVA was run on the total time spent on these four "unsolvable" anagrams. Consistent with the earlier analysis, a significant effect for condition was obtained, $F(2, 65) = 5.187$, $p = .008$, with high efficacy groups ($M = 940.84$) allocating the most time on these anagrams followed by control groups ($M = 926.62$) and then low efficacy groups ($M = 642.62$). A post-hoc Tukey HSD confirmed significant differences between high efficacy and low efficacy conditions, $p = .015$, and low efficacy and control conditions, $p = .024$.

Time spent on the two remaining difficult anagrams was also analyzed using a one-way ANOVA. Overall, the effect for condition was not significant ($F(2,65) = 1.701$, $p = .191$). However, a t-test comparing only high and low efficacy groups did reach significance ($t(1,44) = 2.097$, $p = .042$). As expected, high efficacy groups ($M = 373.68$) spent more time on the difficult anagrams than low efficacy groups ($M = 284.73$).

Collective Efficacy and Performance

It was predicted that condition would have an effect on overall performance, with high efficacy groups outperforming low efficacy groups. To test this prediction, group performance was compared on two tasks--the brainstorming task (Task 2) and the anagram task (Task 4). Task 1 was not considered because it was accomplished prior to experimental manipulations (i.e., performance feedback). Performance on Task 3 was not analyzed because in accordance with the study's design, all groups failed this task.

Task 2: Brainstorming. In order to test the effect of collective efficacy on brainstorming, a one-way ANOVA was run on the number of brainstorming ideas generated during the task period. Although in the predicted direction (i.e., high efficacy groups generated an average of 22.28 ideas compared to 20.93 for low efficacy groups and 20.48 for controls), the differences were not significant, $F(2,72) = .273$, $p = .762$.

Task 4: Anagrams. The effect of collective efficacy on group performance (measured in terms of number correct) on the anagram task was also examined using a one-way ANOVA. Contrary to predictions, there were no significant differences between groups, $F(2,72) = 1.585$, $p = .212$. Controls ($M = 13.040$) had the best success rate followed by high efficacy groups ($M = 12.840$), followed by low efficacy groups (M

= 12.240).

Persistence and performance on task 4. Despite the lack of a performance effect, persistence, in terms of time spent problem solving, was positively correlated with performance on Task 4 ($r = .453$, $p < .0001$). This was true for all groups (see Tables 7 through 9).

Performance on difficult anagrams. Due to the somewhat contradictory results that the efficacy manipulations significantly affected persistence but did not significantly impact performance on Task 4, performance was also compared on the four most difficult (yet solvable) anagrams – “kylix”, “malae”, “hyena”, and “style”. On these anagrams, the extra time devoted by high efficacy and control groups may have paid off in terms of performance. Results of analyses yielded only one significant finding. Specifically, high efficacy and control groups were significantly more likely to solve “style” than low efficacy groups ($X^2(2) = 6.240$, $p = .044$). Results for “hyena” were in the right direction but not significant (see Table 10 for number correct per condition).

Table 10

Overall Number Correct of Four Difficult Anagrams by Condition

Condition	Anagrams				Total
	Kylix	Malae	Hyena	Style	
High Efficacy	0	1	11	20	32
Low Efficacy	2	4	6	12	24
Control	1	3	13	18	35
All Groups	3	8	30	50	91

Collective Efficacy as a Mediator

Efficacy perceptions were expected to mediate the relationship between performance feedback and overall performance. However, because the expected effects of feedback on performance were not found, no mediation analyses were necessary. Feedback effects were found for persistence, and thus, analyses were performed to examine whether collective efficacy mediated this relationship. Specifically, an ANCOVA was run on the persistence measure (time spent problem solving) with general efficacy ratings at Time 3 acting as the covariate. Assessment 3 was used because it was the most proximal measure of efficacy (assessed immediately following Task 3 performance) that was significantly correlated with Task 4 persistence. Although a significant main effect for condition was still obtained, $F(2, 71) = 3.165, p = .048$, examination of the mean square error for the effect revealed that the covariate accounted for half of the variance in persistence accounted for by condition.

CHAPTER 7

DISCUSSION

Overview of Study Findings

The current study presents a number of interesting findings regarding the relationship between collective efficacy and group behavior. Although the predicted performance effects did not occur, collective efficacy manipulations did impact other study variables such as efficacy assessments, goal setting and task persistence. As expected, performance feedback influenced both a group's beliefs about overall effectiveness (i.e., general efficacy), and their performance expectations (i.e., task specific efficacy) for upcoming tasks. Particularly noteworthy is the fact that the influence of feedback transferred to task specific efficacy assessments for different tasks. In terms of functioning, high efficacy groups spent more time problem solving than low efficacy groups. Finally, low efficacy groups set lower goals for performance than control groups and high efficacy groups.

General Efficacy

At the basic level, this study suggests that performance feedback does influence a group's overall assessment of their ability to perform effectively, providing empirical support to Bandura's theorized determinants of collective efficacy. In this case, performance feedback, framed in terms of a normative standard, affected member's evaluations of their group's ability to be effective. Prior to feedback, ratings of general

efficacy were basically equivalent. Only after feedback, did differences emerge between low and high efficacy groups.

More importantly is the evidence that as performance experiences change so do groups assessments of effectiveness. This study provides insight on how efficacy judgments are formed and evolve over time. Ratings varied across assessments for all groups even though the total interaction time was less than two hours. Furthermore, groups appear to use all available information regarding their performance at the time of assessment. In the case of general efficacy, ratings were made immediately following task performance prior to feedback. At Assessment 2, for example, groups had exact information about previous performance on Task 1 (e.g., number correct, ranking compared to peers) and a perception of performance on Task 2. Since Task 2 was considered a fairly easy task (brainstorming), perceptions were likely favorable. As a result, all groups recorded higher ratings on Assessment 2 than on Assessment 1. However, low efficacy groups' ratings on Assessment 2 were significantly lower than either high efficacy or control groups, suggesting that performance feedback also played a role in these ratings. On Assessment 3, ratings decreased for all groups most likely due to the difficulty of the task. Low efficacy groups, however, recorded more of a drop in ratings than other groups, most likely due to the impact of repeated negative performance feedback. Here again, in making assessments of overall effectiveness, groups appear to integrate all sources of performance, both 'formal' feedback and perceptions of performance. They do not merely rely on their judgments of their performance on the current task but also include information on previous performance, even though the tasks

are unrelated (brainstorming vs. probability problem). This is consistent with other efficacy research suggesting that context variables such as performance feedback influence efficacy perceptions (Knight & Kinicki, 1996; Shea & Guzzo, 1987). Finally, without the presence of other information (i.e., formal feedback) perceptions of performance are likely based on perceptions of task difficulty. As evidenced by the fact that immediately following difficult tasks (analogies, analytical reasoning), ratings were lower than following easier tasks (brainstorming, anagrams).

In the absence of feedback (control groups), groups assume they are doing fairly well and behave almost as if they were receiving positive feedback. Indeed, control group ratings were equivalent to high efficacy groups throughout the experimental sequence. Without feedback, perceptions of performance appear to drive ratings of effectiveness. This supports field work by Riggs and Knight (1994) which found that a work groups' efficacy ratings were largely based on perceptions of success/failure (e.g., "The recent work of this department deserves an A+"). In this case, control groups' success/failure judgements were likely based on perceptions of task complexity.

Here, there might be the temptation to conclude that providing groups with positive feedback has no real value in terms of raising ratings of effectiveness. In the short term (across a 2-hour experiment), this may be true. Yet, there is no way of knowing about the long-term effects of withholding feedback on group functioning. Clearly, the implication here is that without feedback, groups may erroneously conclude that their performance is meeting expectations. At least in case of ambiguous tasks, feedback may be essential in correcting behavior. That being said, it is important to note

that the groups in this study were composed of undergraduate college students who are used to doing well on most tasks. Such high expectations may not generalize to the average work group in the general population.

Despite these limitations, results on general efficacy may have some implications for 'real' groups. Assessments of general efficacy, as opposed to task specific measures, may be more suitable for work teams who accomplish a wide range of tasks, at least if the goal is to assess overall effectiveness. In terms of the assessment itself, the findings indicate that general efficacy questionnaires such as the one used in this study and others (Riggs & Knight, 1994; Little & Madigan, 1997) are valid indicators of a group's overall perception of effectiveness. The current study also provides evidence that when arriving at these assessments, groups integrate all available performance information (pre-assessment), not just formalized feedback. Future research might explore how groups integrate other sources of information (i.e., vicarious experience, social influence) to arrive at general assessments of efficacy. Previous research has almost extensively focused on prior performance.

Task Specific Efficacy

Performance feedback also influenced a group's performance expectations for upcoming tasks. At the very least, these findings add support to theoretical predictions in terms of proposed determinants of collective efficacy and confirm findings from other empirical work (Prussia & Kinicki, 1996; Hodges & Carron, 1992). Unlike previous research, however, this study demonstrates that groups also use performance feedback from different tasks for developing expectations about future performance. In this case,

feedback from an analogy task was used to generate expectations about performance on a brainstorming task. Feedback from a brainstorming task was used to generate expectations on an analytical reasoning problem and so on.

The effect of repeated exposure to positive feedback escalated efficacy ratings over time (e.g., high efficacy expectations for Task 3 were stronger than for Task 2). The results indicate that groups who enjoy success have more confidence in their ability to meet performance levels even when problems are unrelated. This occurred despite a perceived increase in task complexity (from brainstorming to analytical reasoning). Control groups also appeared to rely on their perceptions of previous performance as opposed to assessments of future task difficulty as a basis for developing expectations. Their ratings also peaked at Assessment 2 (expectations for analytical reasoning problem). In general, ratings escalated until high efficacy groups received negative feedback or in the case of controls, faced a difficult problem. As expected, this setback lowered performance expectations for the next task. Interestingly, failure had more of a negative impact on high efficacy ratings than low efficacy ratings (i.e., steeper drop from assessment 2 to assessment 3). This is consistent with other empirical work on failure and collective efficacy (Hodges & Carron, 1992).

The presence of failure may also explain the lack of a strong relationship between specific efficacy for Task 4 and other Task 4 variables, such as goal level, persistence, and performance. Previous research has demonstrated a strong positive relationship between performance expectations and these outcomes. In this case, however, task specific efficacy ratings for Task 4 were only significantly related to goal level. Failure

may have watered down expected relationships. After failing Task 3, highly efficacious groups may have had less confidence in their ability to achieve certain performance levels on Task 4 but were still motivated to attempt to correctly answer all questions. As such, their expectations and persistence level were not strongly linked. Interestingly, specific efficacy measured prior to failure, particularly at assessment 2, was significantly associated to all three variables (i.e., the higher the ratings, the higher the goal for task 4, the more persistence directed toward the task 4 and the stronger overall performance on task 4). In some situations, particularly after failure, previous assessments might be a better predictor of group behavior. Highly efficacious groups might be more resilient after failure but their task specific assessments may not be a very good indicator of such resiliency. More work must be done on the effects of failure on the relationship between efficacy assessments and group functioning.

Finally, the findings provide some insight as to how specific efficacy assessments are made without the use of feedback. As was the case with general efficacy, control group ratings were equivalent to high efficacy groups. Without the presence of feedback, groups assumed they were doing extremely well and had high expectations for future performance. The ratings were less stable than expected (pattern actually followed high efficacy groups), suggesting that expectations changed due to perceptions of previous performance, and without formal feedback, controls based these perceptions on perceived task difficulty. Thus, ratings after an easy task (brainstorming) were higher than ratings after more difficult tasks (analogy, analytical reasoning problem). Yet as noted previously, it may also be true that as groups work together and learn each member's

strengths and weaknesses, expectations for performance also grow until faced with a setback (i.e., a difficult problem). Perceived failure may reduce expectations for future performance without necessarily decreasing motivation (in terms of goal choice or persistence) to perform well on tasks. Indeed, control groups set a higher goal and persisted longer on Task 4 than low efficacy groups. Furthermore, their peak efficacy rating (for Task 3) was more predictive of task persistence than their performance expectations for the task that persistence was measured on (Task 4). This also held for high efficacy groups.

Although the low efficacy groups' ratings were significantly lower than high efficacy or control groups at each assessment, the predicted pattern did not emerge for low efficacy groups across time (i.e., expectations for the third task were actually stronger than for the second task). This suggests that low efficacy groups may have had some doubts about the validity of the second feedback. Doubts may have surfaced for several reasons. First, groups may have had more trouble believing that their performance fell below normative standards on two consecutive tasks than believing their performance exceeded standards. Indeed, control groups demonstrate that without feedback, groups hold an extremely positive view of their performance. Second, the task was fairly easy in the sense that most undergraduates can generate ideas for reducing traffic accidents. Again, low efficacy groups may have suspected the veracity of feedback that ranked their performance in the bottom 25th percentile. Finally, contrary to expectations, over 98% of the groups spent the entire period brainstorming, leaving the potential for doubts as to how other groups generated more ideas in the same 15-minute

time period. This problem appeared to be limited to the second task. After 'failing' the analytical reasoning problem, expectations for future performance decreased (lower for the fourth task than for the third task) for all groups, including the low efficacy condition. It appears groups were more willing to 'buy' their failure on an extremely difficult task. Adding to the validity of the feedback, each group was also allowed to review a copy of the approved solution.

The current findings have valuable implications for teams working on a variety of tasks. It appears that groups who have enjoyed success in the past will have stronger expectations for future success, even on new tasks. Although the expected performance effects did not emerge, this study does demonstrate that groups with stronger expectations set higher standards for performance and persist longer even on a relatively new task. Yet, the results also indicate that team leaders must be aware of how failure can affect the relationship between task specific efficacy ratings and other outcomes such as persistence and overall performance. Assessments immediately following failure might not be a good indicator of future group behavior.

Making Efficacy Judgments

Taken together, results from both the general and specific efficacy assessments provide some insight into how groups form collective efficacy judgments. In this case, judgments were heavily influenced by the frequency of particular feedback information. Even immediately following failure (i.e., after Task 3), high efficacy groups rendered more positive assessments of their group's overall effective and future potential than their low efficacy counterparts. If when approaching Task 4, perceived efficacy was based

solely on performance on Task 3 (i.e., more of a recency effect), then differences between groups would not have been shown. This suggests that although current information influences these evaluations, efficacy judgments are not merely a short-term memory perception. In this case, memory of previous performance played a significant role. This also held for certain aspects of group behavior. Here again although all groups failed the third task, high efficacy groups set a higher standard for performance and persisted longer on Task 4 than low efficacy groups, presumably due to the fact that these groups had received multiple positive appraisals prior to Task 3.

Goal Setting

This study also provides support for the theorized relationship between goal setting and collective efficacy. The efficacy manipulations had some effect on goal choice, with low efficacy groups setting significantly lower goals than control groups. Although not significant, low efficacy groups also selected a lower standard for performance on Task 4 than high efficacy groups. Moreover, control groups' performance expectations (task specific efficacy) for Task 4 were significantly related to goal level, with stronger expectations resulting in higher goals.

This study also provides evidence that goal setting for a new task is related to performance expectations from previous tasks. In particular, specific efficacy assessments for Tasks' 2 and 3 were significantly associated with goals for output quantity on Task 4. Less support was found for the relationship between general efficacy assessments and group goal choice (only the relationship between assessment 3 and goal choice was significant for all groups). Some researchers have argued that specific

measures (those targeted at specific levels of performance) are better predictors of goal level because such assessments are conceptually more similar to goals than more process oriented assessments (general measures of efficacy). Indeed, Moss (1998) measured both process and outcome efficacy but found that only specific assessments consistently predicted group goal choice.

Overall, the relationships between goal level and Task 4 variables (persistence, performance) were lower than expected. The failure experience may have impacted these relationships in ways that were not anticipated. After failing Task 3, it might have been the case that highly efficacious groups were attempting to protect themselves from further failure by limiting their goal choice to one in which they could 'safely' attain and not necessarily a true reflection of their performance intentions. Goal setting research has found that groups often set lower goals than individuals in order to appear successful (Hinsz, 1991; 1995). In general, goals reflected a medium range of difficulty (an average of 12 out of 20). It is also likely that groups were not very committed to these goals and thus, less likely to use them to regulate motivational behavior. No effort was made to measure goal commitment. Research has found that goal level is more strongly associated with performance when goal commitment is high (see Locke & Latham, 1990, for a review). Finally, there is some evidence that the strength of the relationship between goal setting and performance is reduced when efficacy is measured. Prussia and Kinicki (1996) argue that "collective efficacy may be an unmeasured variable in past research that spuriously inflated the relationship between group goals and group effectiveness" (p. 196).

Future research must examine how repeated exposure to performance feedback, both positive and negative, affects goals set later in a group's life span. This study implies that failure affects goal setting differently depending upon a group's efficacy level and tenure. Goal setting after failure may be less predictive of outcomes for groups who have enjoyed previous success.

Task Persistence

Most notably, the current study found that efficacy manipulations affected task persistence, demonstrating that collective efficacy impacts a critical motivational factor. In this case, high efficacy groups spent more time problem solving than low efficacy groups. This was true both in terms of overall time spent on the task and time spent on 'unsolvable' items. Moreover, all four general efficacy assessments as well as task specific assessments at Time 1 and 2 were significantly related to persistence on Task 4.

The lack of relationship between performance expectations for Task 4 and persistence for Task 4 suggests that groups' lowered expectations after failing Task 3 did not necessarily impact motivational aspects of group behavior. The presence of failure may also explain the lack of a strong relationship between goal setting and persistence, for high efficacy and control groups. Results indicate that highly efficacious groups persisted beyond their goal choice. Despite lowered expectations and standards, these groups were still motivated to achieve high levels of performance.

Indeed, the current study provides substantial support for the theoretical claim that highly efficacious groups are more resilient after failure. Although less confident, these groups spent more time problem solving than less efficacious groups, presumably to

achieve past success. Control groups also appeared to be motivated to rebound after a difficult performance experience (the analytical reasoning problem), suggesting that the driving determinant of persistence were efficacy perceptions, not necessarily performance feedback. Low efficacy groups, on the other hand, may have developed what other researchers have referred to as a learned skepticism (Weinberg et al., 1979; Hodges & Carron, 1992). In study on self-efficacy, Weinberg et al. (1979) proposed that the lack of persistence on the part of less efficacious individuals was due in part to expectations that present outcomes were uncontrollable. Indeed, Bandura (1997) contends that groups are unlikely to engage in activities if they do not believe they have the power to produce results. After repeated failure, low efficacy groups may have had little faith in their power to attain outcomes, reducing their motivation to persist at the task. Lindsley, Brass, and Thomas (1995) maintain that "beliefs of inefficacy create a negative framework for interpreting new information such that inefficacy appraisals are perpetuated, often leading to debilitating behavior" (p.646). Indeed, low efficacy groups may have labeled themselves as a 'bad group' and initiated a self-fulfilling prophecy for their performance. In a test of the Pygmalion hypothesis at the group level, Eden (1990) was able to raise Army platoon's performance by raising leader's expectations about the entire group (as opposed to individual soldier).

The fact that collective efficacy manipulations did not affect group behavior until later in the experiment (i.e., the final task) also questions whether efficacy can affect immediate behavior. It may be the case that group efficacy only predicts behavior after group members become familiar with the abilities of other members and gain confidence

in the group's ability to coordinate task behaviors (Baker, 2001). In experimental work, Hodges and Carron (1992) did not find a persistence effect until the third trial of performance. Although here the use of different tasks makes it difficult to pinpoint potential time delays, more research should focus on the effect of efficacy manipulations over time.

The persistence finding has important theoretical implications. First, it suggests that collective efficacy does operate through motivational mechanisms such as task persistence. It also adds weight to the theoretical claim that efficacious groups are more resilient after failure.

Overall Performance

Despite the aforementioned persistence differences, the efficacy manipulations did not significantly affect performance on either of the two performance measures. Although means were in the expected direction, the differences were not significant. The failure to find significance is likely due to several factors. First it may be the case that collective efficacy only mediates the relationship between performance feedback and actual performance for the same task. Use of four different tasks may have reduced the chance of finding a performance effect. Indeed, the few studies that have successfully demonstrated a performance effect have utilized the same task throughout the experimental session (Prussia & Kinicki, 1996; Hodges & Carron, 1992). Although means were in the predicted direction, it may be asking too much for a motivational manipulation to affect performance on different tasks over time. At least initially, groups may have seen the variation in tasks as motivating. Thus, despite their performance on

Task 1, low efficacy groups saw Task 2, a different problem, as a new opportunity to meet the normative standards. Although negative feedback caused groups to have lower expectations for performance for Task 2, it did not affect their behavior. On Task 4, however, after repeated negative feedback, low efficacy groups may have felt their chances of success were low no matter what the task, thus spent less time problem solving. Support for this explanation can be found from fieldwork on collective efficacy and athletic performance. Feltz and colleagues (as cited in Hodges & Carron, 1992) argue that collective efficacy may be more predictive of a team's performance at the end of the season. Although some might contend that the task is the same, situational factors (e.g., team stress, opponent's skill level, and penalty minutes) vary making each game different from the next. Thus, in the beginning, failure may be attributed to the unique situational elements (bad call, best player hurt) of that particular game. Although performance expectations are lower, behavior for the next game may be relatively unaffected. However, after repeated failure, teams may believe that losing is inevitable, and performance expectations begin to mirror actual behavior. Teams who are successful early may begin to believe they will win no matter what the situation and thus, work harder and persist longer on subtasks such as defense and passing, which often leads to better overall outcomes. On the empirical side, Hodges and Carron (1992) also found evidence of a performance delay with triads working on a muscular endurance task. After receiving a bogus strength score designed to manipulate efficacy, high and low efficacy groups performed equally well on the first two trials (one with preferred arm, one with non-preferred arm). Differences between conditions only emerged on the third

trial (high efficacy triads outperformed low efficacy triads) after repeatedly failing to outperform confederate groups. Although Prussia and Kinki (1996) found an immediate effect on brainstorming after manipulations, their manipulation consisted of both performance feedback and vicarious learning (i.e., videotape modeling appropriate behavior). Moreover by the time performance was compared, groups had been working together for approximately 30 minutes. The current study implies that performance information alone is not enough to affect behavior on different task at least initially in a group's life span. Indeed, it is unclear how the relationship between efficacy and performance changes over time across different tasks. Future empirical work might consider using both similar and dissimilar tasks to investigate the effects of time and task on efficacy assessments and group functioning. Future studies might also consider the role of affect in the group outcomes. Early on, dissatisfaction with performance feedback may have increased low efficacy groups' motivation for subsequent tasks. Prussia and Kinicki (1996) found that group affective evaluations (in terms of satisfaction with previous performance) were negatively related to group performance on a brainstorming task

The efficacy manipulations did affect some aspects of group behavior (low efficacy groups set lower goals than controls, high efficacy groups persisted longer than low efficacy groups). As such, the lack of performance effects may also be due to the nature of tasks used in this study. In this case, there is evidence that groups were performing at ceiling on Task 2. Collective efficacy is theorized to influence group outcomes through motivational factors such as the direction, level and duration of action.

For example, highly efficacious groups are expected to persist longer on tasks, which usually leads to better outcomes. Although persistence often pays off in brainstorming (at least in terms quantity), in this case, the time limit (15 minutes) may have prevented persistence from taking effect. Over 98% of the groups used the entire time period to generate solutions to the given problem. The nature of the task may have not allowed for the development of motivational differences that are theorized to affect performance.

A similar argument may be posed for the fourth and final task. This task (anagram problems) was designed primarily to measure persistence. As such, it included three extremely difficult and three unsolvable anagrams. It was expected that high efficacy groups would persist longer on the task, and as result outperform low efficacy groups. Despite the expected differences in persistence, high efficacy triads did not significantly outperform low efficacy triads. In fact, the mean for all groups was approximately 13 out of 20, suggesting that only between 13 and 14 anagrams were actually 'solvable' for most undergraduate groups. Although high efficacy groups spent more time solving these six 'unsolvable' anagrams than their low efficacy counterparts, chances are they were unable to recognize the correct combination of letters.

Finally, this study provides some support for theoretical contention that group outcomes are often determined by motivational factors such as effort, persistence, and choice of activities. Although differences between conditions were not significant, task persistence and overall performance was significantly correlated for all groups. Specifically, time spent on Task 4 was positively associated with the number of anagrams

solved. Interventions designed to increase group motivation are likely to reap performance benefits as well.

Limitations

The primary limitation of this study is the failure to find significant effects on performance. Indeed, knowledge of collective efficacy is less critical if it does not affect important aspects of group behavior. A primary goal of understanding the determinants of efficacy perceptions is in its potential for improving group performance. The lack of significance is most reasonably explained by a combination of three factors: a) too weak of a manipulation, b) the experimental tasks, and c) statistical power.

As previously mentioned, low efficacy groups may not have been adequately discouraged by the false feedback. In particular, the fact that efficacy perceptions for Task 3 were stronger than for Task 2 suggests some groups doubted the validity of their second negative feedback. Designed manipulations may not have been strong enough to overcome the potential motivating factor of a new, unrelated task, at least initially in the group's life span. Finally, the nature of the experimental tasks may have not allowed for performance differences no matter how strong the experimental manipulations. There is some evidence that groups were performing near ceiling on both of the tasks.

It could also be the case that collective efficacy only affects performance for the same tasks. Although performance feedback from previous tasks affects confidence levels for new tasks, it may have little impact on new task performance. The use of four different tasks also leads to alternative explanations for other observed effects. One could argue that the use of varying tasks was responsible for the change in general

efficacy perceptions. As evidenced by control groups' responses, ratings appeared to be based on perceptions of previous performance, which were likely influenced by task difficulty. However, the fact that low efficacy groups' ratings were significantly lower than both high efficacy groups and controls indicates that feedback also had an effect. Additionally, general efficacy ratings for all groups were equivalent prior to feedback. And finally, task specific ratings appeared to be made on the basis of previous performance and not on the future task's perceived complexity (expectations were actually strongest for conceivable the most difficult task).

The failure to find significant performance effects may also be due to low statistical power. Effect size analyses indicate that manipulations had small to medium effects (based on Cohen's d criteria) on general efficacy assessments, at least for high efficacy groups. Using this as an estimate of the expected effect size on performance, the current study may lack the power to produce desired results. To achieve even a medium effect size ($d = .50$) with reasonable power, the study would have needed at least 60 groups per condition.

The current findings are also limited by the characteristics of the participants used in the study. Although some findings could be applied to newly formed work teams, collective efficacy may evolve and function differently in long standing groups than in temporary, ad hoc teams. As previously mentioned, the undergraduates in this study may be more motivated than typical members of an applied group. It would be unwise to conclude that without presence of feedback, all groups perceive themselves as successful.

These limitations notwithstanding, this study provides some insight into how groups form efficacy perceptions and how these perceptions evolve across a group's performance experiences. The findings provide empirical support for theoretical predictions in terms of the sources of collective efficacy as well as the effects of these perceptions on a group's goals and motivated behavior. Most notably, results demonstrate that performance feedback from previous tasks affects efficacy judgments and behavior on future, unrelated tasks. Compared to less efficacious groups, highly efficacious groups persisted longer on the final task, even immediately following a failure experience. For leaders intent on motivating groups to reach high levels of performance, interventions designed to boost a group's efficacy level might be one place to start. Coaches and other team leaders might consider structuring practice and training sessions in the form of mastery experiences and/or having proficient models and teammates demonstrate appropriate task behaviors.

APPENDIX A

EXPERIMENTAL TASKS (SAMPE ITEMS)

TASK 1: ANALOGIES

Instructions: In each of the following questions, a related pair of words or phrases is followed by five lettered pairs of words or phrases. AS A GROUP, select the lettered pair that best expresses a relationship similar to that expressed in the original pair.

Place your answers on the attached answer sheet!!!
(Please do not mark on the test booklet)

1. MASON: WALL

- a. artist : easel
- b. fisherman : trout
- c. author : book
- d. congressman : senator
- e. sculptor : mallet

2. REAM: PAPER:

- a. skin : tissue
- b. envelope : letter
- c. cord : wood
- d. swatch : cloth
- e. chisel : stone

TASK 2: BRAINSTORMING

Your group will have 15 minutes to generate as many unique but appropriate ideas as possible to the following problem. Your goal is to “brainstorm” as many ideas as you can in the given time limit. To count, all ideas must be appropriate to the problem.

PROBLEM: The annual number of traffic accidents in Chicago has increased dramatically in the past ten years. What might be done to alleviate this problem? Generate ideas for reducing the number of traffic accidents in major cities? (does NOT have to be specific to Chicago)

TASK 3

You are playing a game of craps, and you've just rolled the dice on your come-out roll.. and the dice total 5. You're a winner if you roll another five before you roll a 7. If you roll a 7 before you roll another 5, you lose. If you roll any other combination before you roll a 5 or a 7, you roll the dice again. With a come-out roll of 5, what are the chances that you will be a winner? You are using two normal dice with six faces on each, numbered 1 through 6.

ANSWER: _____

TASK 4: ANAGRAMS!

Instructions: Next, we would like your group to attempt to solve a series of anagram puzzles. Anagrams are simple words that have had their letters scrambled. The task is to de-scramble the letters in order to figure out what the word is. The anagrams in this booklet vary in difficulty – some are easy, some are moderate, some are extremely difficult. Try your best to find a solution to each anagram, but if you get stuck on one, go on to the next one. Though some of the anagrams are quite difficult, all have solutions.

Please write your answer on the attached answer sheet.

(Please do not mark on the booklet)

**YOU WILL HAVE THE REST OF THE EXPERIMENTAL PERIOD TO
COMPLETE THE TASK.**

1. IJNOT

APPENDIX B
GENERAL EFFICACY ASSESSMENT

Group Assessment

Please circle the number that best represents your level of agreement with each statement.

1. The group I am working with has above average ability to solve these types of problems (i.e., presented in this experiment).

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

2. This group is poor compared to other groups I have worked with doing similar work.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

3. I feel that this group will be successful on future tasks.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

4. Some members of my group do NOT have the skills required to solve these types of problems.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

5. The members of my group interact effectively together .

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

6. Some members of my group have the ability to solve these types of problems.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

7. This group does NOT work well together.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

8. This group is NOT very effective.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

9. The members of my group can solve these types of problems.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

APPENDIX C

TASK SPECIFIC EFFICACY ASSESSMENTS

Performance Expectations

In a few minutes, your group will be asked to engage in a brainstorming task (i.e., requiring your group to generate as many solutions as possible to a given problem). Using the scale below, answer the following questions (i.e., indicate how confident you are that your group will achieve the following performance levels).

Rating Scale

No Confidence										Total Confidence
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

(Fill in confidence level using the above scale)

1. I am _____ confident that my group will perform as well as other groups on this task.
2. I am _____ confident that my group will perform somewhat better than other groups on this task.
3. I am _____ confident that my group will perform much better than other groups on this task.
4. I am _____ confident that my group will perform as well as any other group could possibly do on this task.

Performance Expectations

In a few minutes, your group will be asked to solve an analytical reasoning problem. Using the scale below, answer the following question (i.e., indicate how confident you are that your group will solve the problem)

Rating Scale

No Confidence									Total Confidence	
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

(Fill in confidence level using the above scale)

1. I am _____ confident that my group will solve the problem.

Performance Expectations

In a few minutes, your group will be asked to attempt to solve a set of 20 anagrams. Using the scale below, answer the following questions (i.e., indicate how confident you are that your group will solve the number of anagrams listed).

Rating Scale

No Confidence									Total Confidence	
0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

(Fill in confidence level using the above scale)

1. I am _____ confident that my group will solve at least 4 anagrams
1. I am _____ confident that my group will solve at least 8 anagrams
1. I am _____ confident that my group will solve at least 12 anagrams
1. I am _____ confident that my group will solve at least 16 anagrams
1. I am _____ confident that my group will solve all 20 anagrams

APPENDIX D
GROUP GOAL ASSESSMENT

Group Assessment

In a few minutes, your group will be asked to solve a set of 20 anagrams.

To be considered a successful group, how many anagrams would your group have to solve? _____

Please report one number.

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The final copies have been examined by the director of the dissertation and the signature which appears below verifies the fact that any necessary changes have been incorporated and that the dissertation is now give final approval by the committee with reference to content and form.

The dissertation is therefore accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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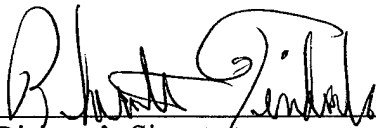
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